HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Washougal River Type-N Coho (Integrated/Segregated)
Species or Hatchery Stock:	Type-N (Late) Coho (*Oncorhynchus kisutch*) Washougal River Stock
Agency/Operator:	Washington Department of Fish and Wildlife
Watershed and Region:	Washougal River/Lower Columbia
Date Submitted:	
Date Last Updated:	August 19, 2014

Executive Summary

The Washington Department of Fish and Wildlife is submitting a Hatchery and Genetic Management Plan (HGMP) for the Washougal River Type-N (late returning) coho program to the National Marine Fisheries (NMFS) for consultation under Section 10(a)(1)(A) or 4(d) of the Endangered Species Act (ESA). NMFS will use the information in this HGMP to evaluate the hatchery impacts on salmon and steelhead listed under the ESA. The primary goal of an HGMP is to devise biologically-based hatchery management strategies that ensure the conservation and recovery of salmon and steelhead populations. This HGMP focuses on the implementation of hatchery reform actions adopted by the Washington Fish and Wildlife Commission Policy on Hatchery and Fishery Reform C-3619.

The purpose of the program is to produce Washougal River Type-N coho for sustainable escapement to the watershed, while providing recreational harvest under mark-selective fisheries. Program fish will be produced at the Washougal Hatchery, located on the Washougal River (WRIA 28.0159). The program will annually release 150,000 yearlings to the Washougal River. In addition, this program provides 2.5-million yearlings for release in the Klickitat River, as part of the Yakima/Klickitat Fisheries Project (Y/KFP).

This Type-N Coho HGMP is built around the principles and recommendations of the Hatchery Scientific Review Group (HSRG). These principles and recommendations represent the best science available for operating hatchery facilities consistent with the conservation of salmonid species. The on-station program is operated as an "integrated type" program, as defined by the HSRG. An "integrated" program is one in which natural-origin individuals are used in the hatchery broodstocks. Integration is achieved by using up to 30% of the returning adult natural-origin Type-N coho (distinguished by an intact adipose fin) returning to the Washougal Hatchery at RKm 32.2, from October through December. All fish released through this hatchery program have been 100% mass-marked (adipose fin-clipped) since brood year 1995; release year 1997, of these, 30,000 yearlings (20%) for the on-station program are also released coded-wire tagged (CWT).

In addition, the fish provided to the Y/KFP are reared as a "segregated type" program. A "segregated" program is one in which only hatchery-origin individuals (identified by the adipose fin-clip) are used in the hatchery broodstocks. Y/KFP releases include 70,000 AD+CWT yearlings (2.8%)

The Lower Columbia River coho are listed as "Threatened" under the ESA. The ESU includes the Washougal River Type-N Coho Program.

Broodstock Collection:
The broodstock is derived from stock returning to the Washougal sub-basin. The proportion of natural-origin fish in the broodstock (pNOB) has averaged 41% over the last three years. Up to 2,150 adults, as escapement allows, are needed to meet the current egg-take goals: 200,500 for the on-station program, and 3.0-million for the Y/KFP. Washougal has been able to meet escapement goals in most years since 2001.

Harvest:
Total annual harvest is dependent on management response to annual abundance in *Pacific Salmon Commission* (PSC - U.S./Canada), *Pacific Fishery Management Council* (PFMC - U.S. ocean), and *Columbia River Compact* forums. WDFW has also received authorization for tributary, Columbia River mainstem, and ocean fisheries; the combined harvest rates in the *Fisheries Management and Evaluation Plan* (FMEP), *Columbia River Fish Management Plan* (CRFMP), and ocean fisheries are reviewed annually in the North of Falcon process. The *U.S. v Oregon* Technical Advisory Committee (TAC) has prepared Biological Assessments (BAs) for combined fisheries based on relevant *U.S. v Oregon* management plans and agreements. The current BA concerns Columbia River treaty Indian and non-Indian fisheries, as described in the "2008–2017 *U.S. v Oregon* Management Agreement for upriver Chinook, sockeye, steelhead, coho, and white sturgeon" (2008–2017 MA).

Due to limitations that not all fish can be accounted for as being harvested or as back-to-rack counts, smolt-to-adult survival rates (SAR) are likely underestimated. Based on the average SAR of 1.61% for brood years 2000-2009, and a programmed release goal of 150,000 integrated on-station yearlings, the estimated production goal would be 2,415 adults.

Monitoring and Evaluation:
Performance indicators for harvest will be accomplished by continuing mass-marking (adipose fin-clip); CWT recoveries help determine stray rate contributions on spawning grounds by watersheds close in proximity to this program's release vicinity.

Operation and Maintenance of Hatchery Facilities:

Washougal Hatchery has water rights to divert water a total of 15,061 gpm from the four sources: two from Washougal River (10 and 12 cfs); one from Boyle Creek (spring water) at 5.5 cfs; and Bob Creek at 3.0 cfs. Both Boyle and Bob creeks are determined to be non-fish-bearing streams. Intake structures pn the Washougal River were designed and constructed to specifications at the time the Washougal facility was built. The *Mitchell Act Intake and Screening Assessment* (2002) determined that the intake screens and velocity at Washougal Hatchery are not compliant with NOAA fish screening standards. WDFW has requested funding for future scoping, design, and construction work of a new intake system.

The return water systems operate under a National Pollutant Discharge Elimination System (NPDES) permit.

1 SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1 Name of hatchery or program.

Washougal River Type-N

1.2 Species and population (or stock) under propagation, and ESA status.

Washougal Type-N (late) Coho (*Oncorhynchus kisutch*)

ESA Status: "Threatened" June 28, 2005 (70FR37160); reaffirmed on August 15, 2011 (76 FR 50448).

1.3 Responsible organization and individuals

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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

NOAA-National Marine Fisheries Service (NMFS) – Manager of Mitchell Act Funds

Yakama Nation (co-manager) – Yakima/Klickitat Fisheries Project (segregated program)

1.4 Funding source, staffing level, and annual hatchery program operational costs.

Funding Sources	Operation Information
Mitchell Act	Full time equivalent staff – 4.6
	Annual operating cost (dollars) - $782,149

The above information for full-time equivalent staff and annual operating cost applies cumulatively to anadromous program facilities and cannot be broken out specifically by program.

1.5 Location(s) of hatchery and associated facilities.

Broodstock Source: Washougal Hatchery Type-N Coho

Table 1.5.1: Location of culturing phases, by facility.

Facility	Culturing Phase	Location
Washougal RB Weir	Broodstock collection,	Washougal R. (WRIA 28.0159) at RKm 22.0 (RM 13.7); tributary to the Columbia R. via Camas Slough (WRIA 28.0154) at RKm 190.1 (RM 118.1), Lower Columbia R., Washington.

Washougal Hatchery	Broodstock collection*, Adult holding/spawning, Incubation, Rearing, Acclimation	Washougal R. (WRIA 28.0159) at RKm 32.2 (RM 20); tributary to the Columbia R.via Camas Slough (WRIA 28.0154) at RKm 190.1 (RM 118.1), Lower Columbia R., Washington.

* If a high flow event prevents trapping at the lower RBW, the Washougal Hatchery fishway will be the secondary collection site, in order to meet broodstock needs.

1.6 Type of program.

Integrated Harvest (on-station releases)

Segregated Harvest (Klickitat releases)

1.7 Purpose (Goal) of program.

Mitigation/Augmentation. The goal of this program is to provide escapement to the watershed and meet sport harvest goals under the mark-selective fishery regulations (retention of adipose-clipped fish only) , consistent with the recovery of ESA listed populations and/or use hatcheries to reduce extinction risk or assist in recovery of listed populations, and minimizing impacts to natural-origin listed salmonids and steelhead. Also serves as mitigation for development (including hydro-power) and habitat degradation.

The Washougal Type-N (late) coho is an integrated program beginning in 2012. An integrated program was tested in the mid 2000's but was found to not be feasible because of the returning fish to the basin from the Klickitat Program (unmarked prior to 2008 release) could not be differentiated for the natural origin fish.

The Washougal Hatchery also rears and outplants 2,500,000 smolts to the Klickitat River, as part of the Yakima/Klickitat Fisheries Project (Y/KFP). Coho smolts released into the Klickitat are solely for harvest opportunity.

1.8 Justification for the program.

The program is funded through the Mitchell Act via NOAA-NMFS for the purpose of mitigation for lost fish production due to development within the Columbia River Basin. The segregated portion of the program is part of the Y/KFP, in cooperation with the Yakama Nation.

WDFW protects listed fish and provides harvest opportunity on hatchery fish through the Lower Columbia River- *Fish Management and Evaluation Plan* (FMEP) (WDFW 2001). All mainstem and tributary fisheries are managed as mark-selective (no wild retention) fisheries to minimize the impact on listed wild fish.

To minimize impact on listed fish by this program and operations, the following risk aversions are included in this HGMP (**Table 1.8.1**).

Table 1.8.1: Summary of risk aversion measures for the Washougal Type-N Coho program.

Potential Hazard	HGMP Reference	Risk Aversion Measures
Water Withdrawal	4.1	Water rights are formalized through trust water right from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports.
Intake Screening	4.1	WDFW has requested funding for future scoping, design, and construction work of a new river intake system to meet NOAA compliance (*Mitchell Act Intake and Screening Assessment* 2002).
Effluent Discharge	4.1	This facility operates under the "U*pland Fin-Fish Hatching and Rearing*" *National Pollution Discharge Elimination System* (NPDES) administered by the Washington Department of Ecology (DOE).

Broodstock Collection & Adult Passage	7.9	All fish are mass-marked marked (adipose fin clipped and/or coded wire tagged) prior to release. Broodstock collection and sorting procedures can quickly identify non-target listed fish (assumed if adipose fin is intact), and if encountered, released per protocol to minimize impact as determined by WDFW Region 5 staff.
Disease Transmission	7.9, 10.11	The *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006) and the *Fish Health Policy in the Columbia Basin* details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Health Policy Chapter 5, IHOT 1995).
Competition & Predation	2.2.3, 10.11	Fish are released at a time, size and the system and life history stage to foster rapid migration to marine waters, and to allow juvenile listed fish to grow to a size that reduces potential for predation. Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to listed fish.

1.9 List of program "Performance Standards".

See HGMP section 1.10. Standards and indicators are referenced from Northwest Power Planning Council (NPPC) Artificial Production Review (APR) (NPPC 2001).

1.10 List of program "Performance Indicators", designated by "benefits" and "risks."

1.10.1 "Performance Indicators" addressing benefits.

Table 1.10.1: "Performance Indicators" addressing benefits.

Benefits		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
3.1.2 Program contributes to mitigation requirements. Program provides mitigation for lost fish production due to development within the Columbia River Basin.	Number of fish released by program returning, or caught, as applicable to given mitigation requirements.	Annually estimate survival and contribution for each brood year released. This program provides mitigation for lost fish production due to development within the Columbia River Basin and contributes to a meaningful harvest in sport and commercial fisheries.
3.1.3 Program addresses ESA responsibilities.	Program complies with Federal ESA-listed fish take authorizations for harvest and hatchery actions. The FMEP has been submitted to NOAA and was revised after the coho listing. Ocean and Columbia River fisheries are covered under section 7 permits.	Hatchery program operation addresses ESA requirements through the development and review of this HGMP. HGMP updated and re-submitted to NOAA with significant changes or under permit agreement. Compliance with ESA is managed with sport fishery regulations that minimize impacts to ESA-listed fish and are monitored by WDFW law

		enforcement officers. The FMEP outlines anticipated encounter rates and expected mortality rates for these fisheries. Natural populations are monitored annually to assess trends and compare with goals.
3.2.1 Fish produced for harvest are propagated and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while adequately minimizing by-catch of non-target species.	Annual number of fish produced by this program caught in all fisheries, including estimates of fish released and associated incidental mortalities, by fisheries.	Annually mass-mark hatchery releases to differentiate hatchery from natural-origin fish and record estimates of mark rate. The external mark enables mark-selective fisheries, which can reduce directed harvest mortality on natural-origin fish. Harvest is regulated to meet appropriate biological assessment criteria. Agencies monitor harvests to provide up-to-date information. Estimate survival and contribution to fisheries for each brood year released.
3.3.1. Artificial propagation program contributes to an increasing number of spawners returning to natural spawning areas.	An annual number of naturally-produced adults or redds on the spawning grounds or selected natural production index areas is estimated.	The returns to the hatchery and spawning grounds are monitored and reported annually.
3.3.2 Releases are sufficiently marked to allow statistically significant evaluation of program contribution to natural production, and to evaluate effects of the program on the local natural population.	Percentage of total hatchery releases are identifiable as hatchery-origin fish. Mass-mark (fin-clip, CWT, otolith-mark, other, etc., depending on species) production fish to identify them from naturally produced fish. See also 3.2.1	Annually monitor and report size, number, mass-mark quality (mark rate/tag rate) and date of all hatchery releases by mark type. Annually sample returning fish for the mass-mark and CWT in fisheries and at the hatchery; monitor and report numbers of estimated hatchery (marked) and natural (unmarked) fish. Report CWT analysis to RMIS database.
3.4.1 Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of population from which broodstock is taken.	Temporal distribution of broodstock collection at point of collection.	Collect broodstock representatively and systematically throughout the return (October through December). Collect annual run timing, age and sex composition and spawning escapement timing data. Adhere to WDFW spawning guidelines (Seidel 1983; HSRG

		2009).
3.5.5 Juveniles are released at fully-smolted stage to benefit juvenile to adult survival rates, and reduce the likelihood for residualism and negative ecological interactions with natural-origin fish.	Level of smoltification (size, appearance, behavior, etc.) at release compared to WDFW rearing and release guidelines. Release type (forced, volitional, or direct).	Monitor fish condition in the facilities throughout all rearing stages. Annually monitor and record size, number, and date of release.
3.6.1 The hatchery program uses standard scientific procedures to evaluate various aspects of artificial propagation.	Apply basic monitoring standards in the hatchery: food conversion rates, growth trajectories, mark/tag rate error, weight distribution (CV).	Collect annual run timing, age and sex composition data upon adult return. Annually record growth rates, mark rate and size at release and release dates. See also HGMP section 11 for program monitoring and evaluation.
3.8.3 Non-monetary societal benefits for which the program is designed are achieved.	Program is designed to help achieve the end goal of conserving and stabilizing natural salmon populations.	Long-term monitoring of system population will indicate success of program.

1.10.2 "Performance Indicators" addressing risks.

Table 1.10.2: **"Performance indicators" addressing risks.**

Risks		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
3.1.3 Program addresses ESA responsibilities	Program complies with Federal ESA-listed fish take authorizations for harvest and hatchery actions.	HGMP is updated to reflect any major changes in program and resubmitted to NOAA fisheries. Program risks have been addressed in this HGMP through best available science hatchery management actions. WDFW staff annually reviews Future Brood Document (FBD) for stock, size, number, date and location of releases from all production programs. Monitor and record juvenile hatchery fish size, number, date of release and mass-mark quality; monitor contribution of hatchery adult fish to fisheries and escapement.
3.2.1 Fish produced for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while adequately minimizing by-catch of non-target species.	The number of marks released and the proportion of marks in out-migrant juveniles and returning adults on the spawning ground are estimated annually. Production fish are mass-marked (adipose fin-clip) to allow for their differentiation from	Monitor and record juvenile hatchery fish size, number, date of release and mass-mark (fin clips, tags, etc.) quality; monitor contribution of hatchery adult fish to fisheries and escapement. Harvest is regulated to meet appropriate biological

	naturally-produced fish	assessment criteria. Coho fisheries in the Washougal River are mark selective, and require the release of all wild coho. Agencies monitor harvests and hatchery escapements to provide up-to-date information.
3.2.2 Release groups are sufficiently marked in a manner consistent with information needs and protocols to enable determination of impacts to natural- and hatchery-origin fish in fisheries.	Percentage of total hatchery releases are identifiable as hatchery-origin fish. Mass-mark (adipose-fin clip, CWT, otolith-mark, etc., depending on species) produced fish to allow for their differentiation from naturally produced fish for selective fisheries.	Annually monitor and report size, number, date of release and mass-mark quality (adipose fin-clip rate) of all hatchery releases. Annually assess harvest of mass-marked hatchery fish based on CRC estimates and creel surveys.
3.3.2 Releases are sufficiently marked to allow statistically significant evaluation of program contribution to natural production and to evaluate effects of the program on the local natural population.	All hatchery production is identifiable in some manner (fin-marks, tags, otolith, etc.) consistent with information needs.	Annually monitor and record size, number, date of release and mass-mark quality (tag rate) of hatchery releases. Examine returning fish encountered for the mass-mark (CWT) at the hatchery and on the spawning ground. Annually record numbers of estimated hatchery (marked) and natural (unmarked).
3.4.1 Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of population from which broodstock is taken.	Temporal and age distribution of broodstock collected, compared to that of naturally-produced population at collection point.	Collect annual run timing, age and sex composition and return timing data.
3.4.3 Life history characteristics of the natural population do not change as a result of the hatchery program.	Life history characteristics are measured in adult and juvenile hatchery fish: return timing, age and sex composition, spawning timing, and size in returning hatchery adults; size, growth rates, and survival to release in juvenile production. Life history patterns of juvenile and adult NOR are stable.	Collect annual run timing, origin, and age and sex composition data. Annually monitor and record juvenile hatchery fish size, growth rates, number released, mass-mark/tag data, survival-to-release rates, and date of release. Examine returning fish for the mass-mark (fin-clips, CWTs) at broodstock collection points and on the spawning grounds. Annually record and report numbers of estimated hatchery (marked) and natural (unmarked).
3.5.1 Patterns of genetic variation within and among natural populations do not change significantly as a result of artificial production.	Within and between populations, genetic structure is not affected by artificial production.	See HGMP section 11 for M&E information.

3.5.2 Collection of broodstock does not adversely impact the genetic diversity of the naturally-spawning population.	Total number of natural-origin spawners (if any) reaching the collection facility. Timing of collection compared to overall run timing.	All on-station hatchery releases are identifiable in some manner (fin-marks, tags, etc.). Collect annual run timing, origin, and age and sex composition data. CWT data reported to RMIS. Examine returning fish for the mass-mark (fin-clips, CWTs) at broodstock collection points and on the spawning grounds. Annually record and report numbers of estimated hatchery (marked) and natural (unmarked). Natural-origin fish in excess of broodstock goals are passed upstream.
3.5.3 Hatchery-origin adults in natural production areas do not negatively affect the total natural spawning population.	The ratio of observed and/or estimated total numbers of artificially-produced fish on natural spawning grounds, to total number of naturally-produced fish (pHOS).	Examine returning fish for the mass-mark (fin-clips, CWTs) at broodstock collection points and on the spawning grounds. Annually record and report numbers of estimated hatchery (marked) and natural (unmarked). Hatchery-origin fish in excess of broodstock needs are removed from the system. Natural-origin fish in excess of broodstock goals are passed upstream.
3.5.4 Juveniles are released on-station, or after sufficient acclimation to maximize homing ability to intended return locations.	Location of release (on-station, acclimation pond, direct plant). Release type (forced, volitional or direct stream release). Proportion of adult returns to program's intended return location, compared to fisheries and artificial or natural production areas.	Annually record and report release information, including location, method and age class in hatchery data systems (WDFW Hatcheries Headquarters Database).
3.5.5 Juveniles are released at fully-smolted stage.	Level of smoltification at release. Release type (forced, volitional or direct).	Annually monitor and record size, number, date of release and release type.
3.7.1 Hatchery facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols (IHOT, PNFHPC, *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State*).	Annual reports indicating levels of compliance with applicable standards and criteria. Periodic audits indicating level of compliance with applicable standards and criteria.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed. See also **Attachment 1** for pre-release Fish Health History. The program is operated

		consistent with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006), *Fish Health Policy in the Columbia Basin*, and *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Health Policy Chapter 5, IHOT 1995).
3.7.2 Effluent from hatchery facility will not detrimentally affect natural populations.	Discharge water quality compared to applicable water quality standards by NPDES permit. WDFW water right permit compliance.	Flow and discharge reported in monthly NPDES reports.
3.7.3 Water withdrawals and in-stream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning behavior of natural populations, or impact juvenile rearing environment.	Water withdrawals compared to NMFS, USFWS and WDFW applicable passage and screening criteria for juveniles and adults.	Barrier and intake structure compliance assessed and needed fixes are prioritized.
3.7.4 Releases do not introduce pathogens not already existing in the local populations, and do not significantly increase the levels of existing pathogens. Follow the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, revised 2006).	Necropsies of fish to assess health, nutritional status, and culture conditions.	DFW Fish Health Section inspect adult broodstock yearly for pathogens and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	Release and/or transfer exams for pathogens and parasites.	Examine fish 1 to 6 weeks prior to transfer or release, in accordance with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006).
	Inspection of adult broodstock for pathogens and parasites.	At spawning, lots of 60 adult broodstock are examined for pathogens.
	Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites.	Controls of specific fish pathogens through eggs/fish movements are conducted in accordance to the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006).

3.7.6 Adult broodstock collection operation does not significantly alter spatial and temporal distribution of any naturally-produced population.	Spatial and temporal spawning distribution of natural populations above and below broodstock collection site is currently compared to historic distribution.	Trap is checked daily. Non-target and/or ESA listed fish, when encountered, are returned to the river.
3.7.7 Weir/trapping operations do not result in significant stress, injury or mortality in natural populations.	Mortality rates in trap. Pre-spawning mortality rates of captured fish in the hatchery and/or after release.	Traps checked daily. Annually record and report abundances and observations of natural-origin fish at hatchery facilities.
3.7.8 Predation by artificially produced fish on naturally – produced fish does not significantly reduce numbers of natural fish.	Hatchery juveniles are raised to smolt-size and released from the hatchery at a time that fosters rapid migration downstream.	Hatchery smolt release size and time are monitored to quantify/minimize predation effects on naturally-origin salmon and steelhead (Sharpe et al. 2008).
3.8.1 Cost of program operation does not exceed the net economic value of fisheries in dollars per fish for all fisheries targeting this population.	Total cost of operation.	Compare annual operational cost of program to calculated fishery contribution value (Wegge 2009).
3.8.2. Juvenile production costs are comparable to or less than other regional programs designed for similar objectives.	Total cost of program operation.	Annually monitor and report feed costs and fish health actions.

1.11 Expected size of program.

1.11.1 Proposed annual broodstock collection level (maximum number of adult fish).

Up to 2,150 adults at a 1:1 male to female ratio, as the escapement allows; jacks will be included at up to 2% of the total spawning population. This is based on a an average fecudity of 3,200 eggs/female, and a 10% pre-spawning mortality. Collected broodstock supports the 150,000 yearling coho on-station release, and 2,500,000 yearlings for the Klickitat River out-plant portion. Washougal has been able to meet escapement for this system in most years (2,150 adults) since 2001.

1.11.2 Proposed annual fish release levels (maximum number) by life stage and location.

Table 1.11.1: Proposed annual fish release levels (maximum number) by life stage and location.

Age Class	Max. No.	Size (fpp)	Release Date	Location	Major Watershed
Yearlings	150,000	15.0	May/June	Washougal River	Washougal
	2.5-million	20.0	April	Klickitat River	Klickitat

Source: Future Brood Document 2014.

1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

Table 1.12.1: Washougal Hatchery N-Type coho total on-station integrated releases and adult returns.

Year	Total Release	Hatchery Escapement
2002	539,620	19,743
2003	508,650	6,407
2004	508,050	4,304
2005	534,940	3,500
2006	498,540	11,085
2007	500,180	5,362
2008*	498,235	6,234
2009	237,000	14,429
2010	159,277	2,964
2011	151,550	1,684
2012	152,039	1,378
2013	153,227	2,777
Average	**370,109**	**6,656**

Note*harvest program was reduced from 500K to 150K.
Source: WDFW Hatcheries Headquarters Database 2014.

See also **Table 3.3.1.1.**

1.13 Date program started (years in operation), or is expected to start.

Washougal Hatchery began operations in 1958. The first year of operation for this program was 1985; the Klickitat portion of the program started in 1988.

1.14 Expected duration of program.

Program is on-going, with no plans for termination.

1.15 Watersheds targeted by program.

Washougal River (WRIA 28.0159/ Washougal Subbasin/ Lower Columbia Province).

1.16 Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

1.16.1 Brief Overview of Key Issues.

Broodstock in the Washougal River are collected at the hatchery weir on the Washougal River (RKm 32.2). Washougal Hatchery coho have been mass-marked across all age classes since brood year 1995. The hatchery is located above a barrier falls that historically limited the passage of anadromous fish. Hatcheries can be managed for recovery and/or harvest benefits. In addition, returning hatchery carcasses can be used for nutrient enhancement. The nutrients can have positive benefits on all listed stocks because they can increase a watersheds juvenile salmonid productivity and capacity.

1.16.2 Potential Alternatives to the Current Program

Alternative 1: *Eliminate the program*: This action would reduce potential interaction with natural populations and eliminate potential impacts on other ESA-listed species. Currently this program supports popular sport and commercial fisheries in the Columbia River and the Washougal and Klickitat River, and is consistent with the mitigation requirements. In 2009, the HSRG recommended eliminating Washougal out-plants in the Klickitat River. This alternative does not

meet tribal harvest goals and *U.S. v Oregon* agreements, and was therefore was not considered for implementation. More detailed rationale for rejecting the alternatives can be found in the revised *Klickitat River Anadromous Fisheries Master Plan* (Yakama Nation 2008, in draft) (see also Klickitat Complex Coho HGMP).

Alternative 2: *Move coho production for Klickitat tribal mitigation to the Klickitat River Hatchery*. Current capacity is not available for this alternative.

1.16.3 Potential Reforms and Investments

Reform/Investment 1: *Current screening and passage were not compliant with current NOAA-NMFS standards for ESA fish.* The *Intake and Passage Report* (2002) indicates that the screens and passage are not in compliance with current standards. The fish passage at the hatchery intake was resolved in 2011 but the intake compliance still needs to be addressed.

2 SECTION 2. PROGRAM EFFECTS ON NMFS ESA-LISTED SALMONID POPULATIONS. (USFWS ESA-Listed Salmonid Species and Non-Salmonid Species are addressed in Addendum A)

2.1 List all ESA permits or authorizations in hand for the hatchery program.

None currently. This HGMP is submitted to the NOAA Fisheries for ESA consultation and take prohibition exemption under ESA section 4(d) or 10.

2.2 Provide descriptions, status, and projected take actions and levels for NMFS ESA-listed natural populations in the target area.

2.2.1 Description of NMFS ESA-listed salmonid population(s) affected by the program.

- Identify the NMFS ESA-listed population(s) that will be directly affected by the program.

Lower Columbia River coho (*Oncorhynchus kisutch*). Identified as a candidate species on June 25, 1995 (60FR38011). Listed as threatened on June 28, 2005 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

- Identify the NMFS ESA-listed population(s) that may be incidentally affected by the program.

Lower Columbia River Chinook (*Oncorhynchus tshawytscha*). Listed as "threatened" on March 24, 1999 (64FR14308); threatened status reaffirmed on June 28, 2005 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

Lower Columbia River steelhead (*Oncorhynchus mykiss*). Listed as a threatened species on March 19, 1998 (63FR13347); threatened status reaffirmed on January 5, 2006 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

Columbia River chum salmon (*Oncorhynchus keta*). Listed as threatened on March 25, 1999 (64FR14507); threatened status reaffirmed on June 28, 2005 (70FR37160); reaffirmed threatened by five-year status review, completed August 15, 2011 (76 FR 50448).

2.2.2 Status of NMFS ESA-listed salmonid population(s) affected by the program.

- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds.

Lower Columbia River Chinook: In Washington, the LCR Chinook ESU includes all naturally spawned Chinook populations from the mouth of the Columbia to a transitional point between

Washington and Oregon east of the Hood River and the White Salmon River, as well as fifteen artificial propagation programs. Excluded are Upper Columbia River bright hatchery stocks that spawn in the mainstem Columbia River below Bonneville Dam and in other tributaries upstream from the Sandy River to the Hood and White Salmon rivers (NMFS 2014 79FR20802).

Status: Today only two of 32 historical populations – the North Fork Lewis and Sandy late-fall populations – are considered viable. Most populations (26 out of 32) have a very low probability of persistence over the next 100 years, and some populations are extirpated, or nearly so. Five of the six strata fall significantly short of the Willamette- Lower Columbia Technical Recovery Team (WLC TRT) criteria for viability. One stratum – Cascade late fall – meets the WLC TRT criteria (Dornbush and Sihler 2013). Dam construction eliminated habitat for a number of populations leading to the extirpation of spring Chinook salmon populations in the Upper Cowlitz, Cispus, Tilton, North Fork Lewis , Big White Salmon rivers, and fall Chinook populations in the Upper Cowlitz and Big White Salmon rivers (SHIEER, NMFS 2004). Projects to allow access have been initiated in the Cowlitz and Lewis systems but these are not close to producing self-sustaining populations; Condit Dam on the Big White Salmon River was breached October 26, 2011. Based on the 2010 recovery plan analyses, all of the 14 Tule populations (**Table 2.2.2.1**) are considered very high risk except one that is considered at high risk. The modeling conducted in association with Tule harvest management suggests that three of the populations (Coweeman, Lewis and Washougal) are at a somewhat lower risk (LCFRB 2010).

Table 2.2.2.1: Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River Chinook populations.

		Baseline viability					Prod.	Abundance		
Population	Contribution	A&P	S	D	Net	Obj.	target	Historical	Baseline	Target
Coast Fall										
Grays/Chinook	Contributing[2]	VL	H	VL	VL[2]	M+	+500%	800	<50	1,000
Eloch/Skam [C]	Primary	VL	H	L	VL[2]	H	+150%	3,000	<50	1,500
Mill/Aber/Germ	Primary[1]	VL	H	L	VL[2]	H	+155%	2,500	50	900
Youngs Bay (OR)	Stabilizing	--[3]	--[3]	--[3]	L	L	--[3]	--[3]	--[3]	--[3]
Big Creek (OR) [C]	Contributing[1]	--[3]	--[3]	--[3]	VL	L	--[3]	--[3]	--[3]	--[3]
Clatskanie (OR)	Primary	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]
Scappoose (OR)	Primary[1]	--[3]	--[3]	--[3]	L	H	--[3]	--[3]	--[3]	--[3]
Cascade Fall										
Lower Cowlitz [C]	Contributing	VL	H	M	VL[2]	M+	+50%	24,000	500	3,000
Upper Cowlitz	Stabilizing	VL	VL	M	VL	VL	--	28,000	0	--
Toutle[C]	Primary[1]	VL	H	M	VL[2]	H+	+265%	11,000	<50	4,000
Coweeman [G]	Primary	VL	H	H	VL[2]	H+	+80%	3,500	100	900
Kalama	Contributing[2]	VL	H	M	VL[2]	M	+110%	2,700	<50	500
Lewis [G]	Primary	VL	H	H	VL[2]	H+	+280%	2,600	<50	1,500
Salmon	Stabilizing	VL	H	M	VL	VL	--	n/a	<50	--
Washougal	Primary	VL	H	M	VL[2]	H+	+190%	2,600	<50	1,200
Clackamas (OR) [C]	Contributing	--[3]	--[3]	--[3]	VL	M	--[3]	--[3]	--[3]	--[3]
Sandy (OR)	Contributing[1]	--[3]	--[3]	--[3]	VL	M	--[3]	--[3]	--[3]	--[3]
Cascade L Fall										
Lewis NF [C,G]	Primary	VH	H	H	VH[1]	VH	0%	23,000	7,300	7,300
Sandy (OR) [C,G]	Primary	--[3]	--[3]	--[3]	H	VH	--[3]	--[3]	--[3]	--[3]
Cascade Spring										
Upper Cowlitz [C,G]	Primary	VL	L	M	VL[2]	H+	>500%	22,000	300	1,800
Cispus [C,G]	Primary	VL	L	M	VL[2]	H+	>500%	7,800	150	1,800
Tilton	Stabilizing	VL	VL	VL	VL	VL	0%	5,400	<100	--
Toutle	Contributing	VL	H	L	VL	M	>500%	3,100	100	1,100
Kalama	Contributing[2]	VL	H	L	VL	L	>500%	4,900	100	300
Lewis NF [C]	Primary	VL	L	M	VL	H	>500%	15,700	300	1,500
Sandy (OR) [C,G]	Primary	--[3]	--[3]	--[3]	M	H	--[3]	--[3]	--[3]	--[3]
Gorge Fall										
L. Gorge (WA/OR)	Contributing	VL	M	L	VL[2]	M	>500%	n/a	<50	1,200
U. Gorge (WA/OR) [C]	Contributing[1]	VL	M	L	VL[2]	M	>500%	n/a	<50	1,200
White Salmon [C]	Contributing	VL	L	L	VL	M	>500%	n/a	<50	500
Hood (OR)	Primary[4]	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]
Gorge Spring										
White Salmon [C]	Contributing	VL	VL	VL	VL	L+	>500%	n/a	<50	500
Hood (OR)	Primary	--[3]	--[3]	--[3]	VL	VH	--[3]	--[3]	--[3]	--[3]

Source: LCFRB 2010.

L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.

[1] Increase relative to interim Plan.

[2] Reduction relative to interim Plan.

[3] Addressed in Oregon Management Unit plan.

[C] Designated as a historical core population by the TRT.

[G] Designated as a historical legacy population by the TRT.

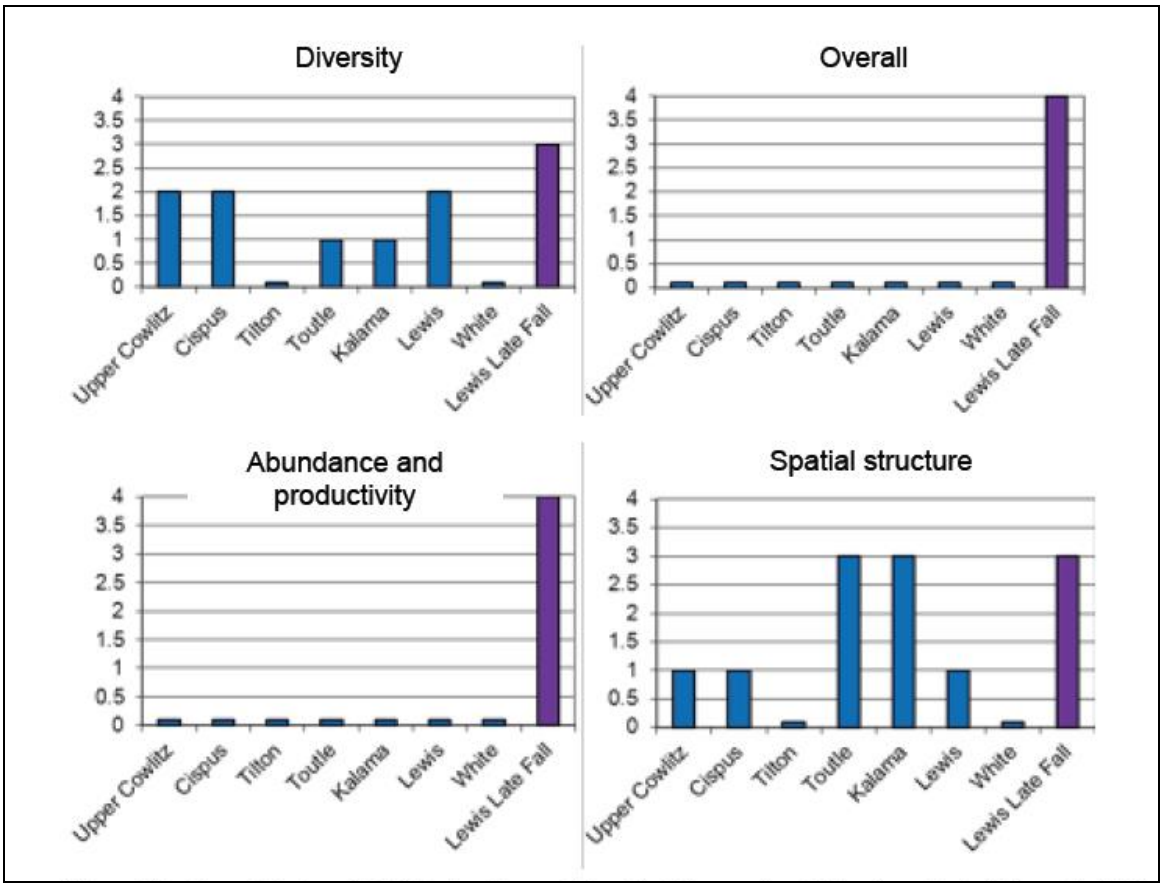

Figure 2.2.2.1: Current status of Washington lower Columbia River spring Chinook and late fall-run (bright) Chinook salmon populations for the VSP parameters and overall population risk. (LCFRB Recovery Plan 2010, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

Lower Columbia River Steelhead *(Oncorhynchus mykiss)*: The DPS includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in streams and tributaries to the Columbia River between the Cowlitz and Wind Rivers, Washington (inclusive), and the Willamette and Hood Rivers, Oregon (inclusive), and excludes fish originating from the upper Willamette River Basin above Willamette Falls.The DPS includes seven artificial propagation programs, including the Cowlitz Trout Hatchery Winter-late (Lower Cowlitz), Kalama River Wild (winter- and summer-run) and Lewis River Wild Winter (NMFS 2014 79FR20802).

Status: Today, 16 of the 23 Lower Columbia River steelhead populations have a low or very low probability of persisting over the next 100 years, and six populations have a moderate probability of persistence. Only the summer-run Wind population is considered viable. All four strata in the DPS fall short of the WLC TRT criteria for viability (Dornbush and Sihler 2013). Populations in the upper Lewis and Cowlitz watersheds remain cut-off from access to essential spawning habitat by hydroelectric dams. Projects to allow access have been initiated in the Cowlitz and Lewis systems but these have not yet produced self-sustaining populations (Ford 2011). Condit Dam on the White Salmon River was breached October 26, 2011. WDFW is currently developing watershed-specific management plans in accordance with the SSMP. As part of this planning process, WDFW is proposing to complete a thorough review of current steelhead stock status using the most up to date estimates of adult abundance, juvenile production and genetic information.

Table 2.2.2.2: Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River steelhead populations.

		Baseline viability					Prod.	Abundance		
Population	Contribution	A&P	S	D	Net	Obj.	target	Historical	Baseline	Target
Coast Winter										
Grays/Chinook	Primary	VH	VH	M	M[1]	H	0%[4]	1,600	800	800
Eloch/Skam	Contributing	VH	VH	M	M[1]	M+	0%[4]	1,100	600	600
Mill/Ab/Germ	Primary	H	VH	M	M[1]	H	0%[4]	900	500	500
Youngs Bay (OR)	Primary	--[3]	--[3]	--[3]	VH	VH	--[3]	--[3]	--[3]	--[3]
Big Creek (OR)	Primary	--[3]	--[3]	--[3]	H	VH	--[3]	--[3]	--[3]	--[3]
Clatskanie (OR)	Primary	--[3]	--[3]	--[3]	VH	VH	--[3]	--[3]	--[3]	--[3]
Scappoose (OR)	Primary	--[3]	--[3]	--[3]	VH	VH	--[3]	--[3]	--[3]	--[3]
Cascade Winter										
Lower Cowlitz	Contributing	L	M	M	L	M	+5%	1,400	350	400
Upper Cowlitz [C,G]	Primary	VL	M	M	VL[2]	H[1]	>500%	1,400	<50	500
Cispus [C,G]	Primary	VL	M	M	VL[2]	H[1]	>500%	1,500	<50	500
Tilton	Contributing	VL	M	M	VL	L	>500%	1,700	<50	200
S.F. Toutle	Primary	M	VH	H	M	H+	+35%	3,600	350	600
N.F. Toutle [C]	Primary	VL	H	H	VL[2]	H	+125%		120	600
Coweeman	Primary	L	VH	VH	L[2]	H	+25%	900	350	500
Kalama	Primary	L	VH	H	L[2]	H+	+45%	800	300	600
N.F. Lewis [C]	Contributing	VL	M	M	VL[2]	M	>500%	8,300	150	400
E.F. Lewis	Primary	M	VH	M	M[1]	H	+25%	900	350	500
Salmon	Stabilizing	VL	H	M	VL[2]	VL	0%	na	<50	--
Washougal	Contributing	L	VH	M	L[2]	M	+15%	800	300	350
Clackamas (OR) [C]	Primary	--[3]	--[3]	--[3]	M	H	--[3]	--[3]	--[3]	--[3]
Sandy (OR) [C]	Primary	--[3]	--[3]	--[3]	L	VH	--[3]	--[3]	--[3]	--[3]
Cascade Summer										
Kalama [C]	Primary	H	VH	M	M[1]	H	0%[4]	1,000	500	500
N.F. Lewis	Stabilizing	VL	VL	VL	VL	VL	0%	na	150	--
E.F. Lewis [G]	Primary	VL	VH	M	VL[2]	H	>500%	600	<50	500
Washougal [C,G]	Primary	M	VH	M	M[1]	H	+40%	2,200	400	500
Gorge Winter										
L. Gorge (WA/OR)	Primary	L	VH	M	L[2]	H	+45%	na	200	300
U. Gorge (WA/OR)	Stabilizing	L	M	M	L[2]	L	0%	na	200	--
Hood (OR) [C,G]	Primary	--[3]	--[3]	--[3]	M	H	--[3]	--[3]	--[3]	--[3]
Gorge Summer										
Wind [C]	Primary	VH	VH	H	H[1]	VH	0%[4]	na	1,000	1,000
Hood (OR)	Primary	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]

Source: LCFRB 2010.

L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.

[1] Increase relative to interim Plan.

[2] Reduction relative to interim Plan.

[3] Addressed in Oregon Management Unit plan.

[4] Improvement increments are based on abundance and productivity; however, this population will require improvement in spatial structure or diversity to meet recovery objectives.

[C] Designated as a historical core population by the TRT.

[G] Designated as a historical legacy population by the TRT.

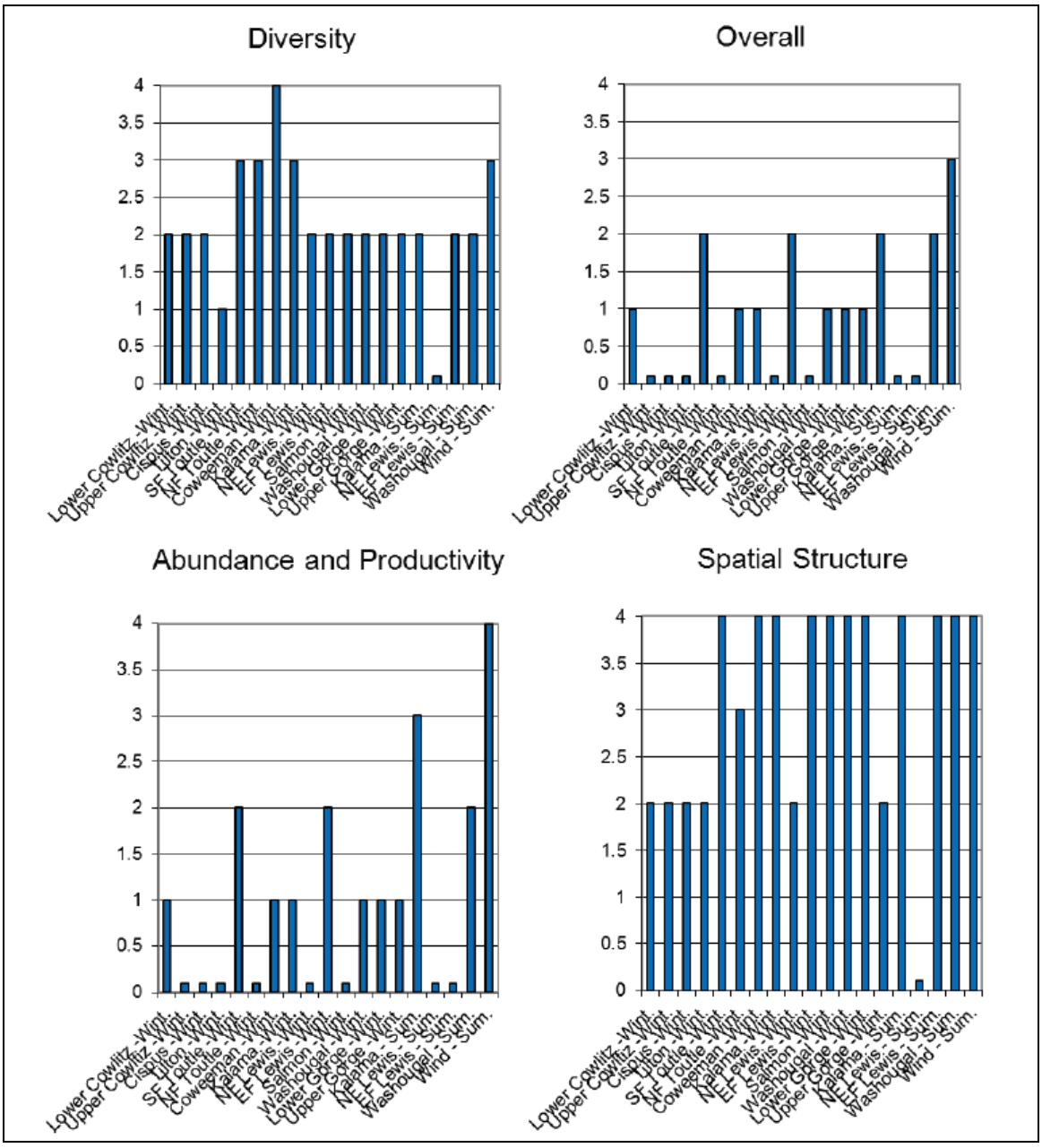

Figure 2.2.2.2: Current status of Washington LCR steelhead populations for the VSP parameters and overall population risk. (LCFRB 2010 Recovery Plan, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

Lower Columbia River coho *(Oncorhynchus kisutch)*: Originally part of a larger Lower Columbia River/Southwest Washington ESU, Lower Columbia coho were identified as a separate ESU and listed as threatened on June 28, 2005. The ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries in Washington and Oregon, from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers, The twenty-one artificial propagation programs include: the Grays River, Peterson Coho Project, Cowlitz Type-N Coho Program in the Upper and Lower Cowlitz Rivers, Cowlitz Game and Anglers Coho Program, Friends of the Cowlitz Coho Program, North Fork Toutle River Hatchery, Kalama River Type-N and Type-S Coho Programs, Lewis River Type-N and Type-S

Coho programs, Fish First Wild Coho and Type-N Coho programs, Syverson Project Type-N Coho Program, and Washougal Hatchery Type-N Coho Program (NMFS 2014 79FR20802).

Status: Status evaluations of LCR coho status, all based on WLC-TRT criteria, have been conducted since the last BRT status update in 2005 (McElhany et al. 2007, Beamesderfer et al. 2010, LCFRB 2010, Dornbusch and Sihler 2013). All of these evaluations concluded that the ESU is currently at very high risk of extinction. All of the Washington side populations are considered at very high risk, although uncertainty is high because of a lack of adult spawner surveys. The 2005 BRT evaluation noted that smolt traps indicate some natural production in Washington populations, though given the high fraction of hatchery origin spawners suspected to occur in these populations it is not clear that any are self-sustaining (Ford 2011). Since this time WDFW has implemented an ESU wide monitoring program for LCR coho which began in 2010. Preliminary results indicate that natural origin population abundance may be higher than previously thought for certain populations (WDFW, unpublished). Results from the first 3 years of monitoring should be available in the near future. Currently, 21 of the 24 Lower Columbia River coho salmon populations are considered to have a very low probability of persisting over the next 100 years, and none is considered viable (Dornbusch and Sihler 2013). All three strata in the ESU fall significantly short of the WLC TRT criteria for viability.

Table 2.2.2.3: Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River coho populations.

		Baseline viability					Prod.	Abundance		
Population	Contribution	A&P	S	D	Net	Obj.	target	Historical	Baseline	Target
Coast										
Grays/Chinook [L]	Primary	VL	H	VL	VL[2]	H	+370%	3,800	<50	2,400
Eloch/Skam [L]	Primary	VL	H	VL	VL[2]	H	+170%	6,500	<50	2,400
Mill/Ab/Germ [L]	Contributing	VL	H	L	VL[2]	M	>500%	2,800	<50	1,800
Youngs (OR) [L]	Stabilizing	--[3]	--[3]	--[3]	VL	VL	--[3]	--[3]	--[3]	--[3]
Big Creek (OR) [L]	Stabilizing[2]	--[3]	--[3]	--[3]	VL	VL	--[3]	--[3]	--[3]	--[3]
Clatskanie (OR) [L]	Primary[1]	--[3]	--[3]	--[3]	L	VH	--[3]	--[3]	--[3]	--[3]
Scappoose (OR) [L]	Primary	--[3]	--[3]	--[3]	M	VH	--[3]	--[3]	--[3]	--[3]
Cascade										
Lower Cowlitz [L]	Primary	VL	M	M	VL[2]	H	+100%	18,000	500	3,700
Upper Cowlitz [E, L]	Primary[1]	VL	M	L	VL	H[1]	>500%	18,000	<50	2,000
Cispus [E, L]	Primary[1]	VL	M	L	VL	H[1]	>500%	8,000	<50	2,000
Tilton [E, L]	Stabilizing[2]	VL	M	L	VL	VL[2]	0%	5,600	<50	--
Toutle SF [E, L]	Primary	VL	H	M	VL[2]	H	+180%	27,000	<50	1,900
Toutle NF [E, L]	Primary	VL	M	L	VL[2]	H	+180%		<50	1,900
Coweeman [L]	Primary	VL	H	M	VL[2]	H	+170%	5,000	<50	1,200
Kalama [L]	Contributing	VL	H	L	VL[2]	L	>500%	800	<50	500
NF Lewis [E, L]	Contributing	VL	L	L	VL[2]	L	+50%	40,000	200	500
EF Lewis [E, L]	Primary	VL	H	M	VL[2]	H	>500%	3,000	<50	2,000
Salmon [L]	Stabilizing	VL	M	VL	VL	VL	0%	na	<50	--
Washougal [L]	Contributing	VL	H	L	VL[2]	M+	>500%	3,000	<50	1,500
Clackamas (OR) [E, L]	Primary	--[3]	--[3]	--[3]	M	VH	--[3]	--[3]	--[3]	--[3]
Sandy (OR) [E, L]	Primary	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]
Gorge										
L Gorge (WA/OR) [L]	Primary	VL	M	VL	VL[2]	H	+400%	na	<50	1,900
U Gorge (WA) [L]	Primary[1]	VL	M	VL	VL[2]	H	+400%	na	<50	1,900
U Gorge/Hood (OR)[E]	Contributing[4]	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]

Source: LCFRB 2010.
L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.
[1] Increase relative to interim Plan.
[2] Reduction relative to interim Plan.
[3] Addressed in Oregon Management Unit plan.
[4] Improvement increments are based on abundance and productivity; however, this population will require improvement in spatial structure or diversity to meet recovery objectives.
[E] Early run (Type S) coho stock.
[L] Late run (Type N) coho stock.
(Core and Legacy populations not designated by the TRT for coho).

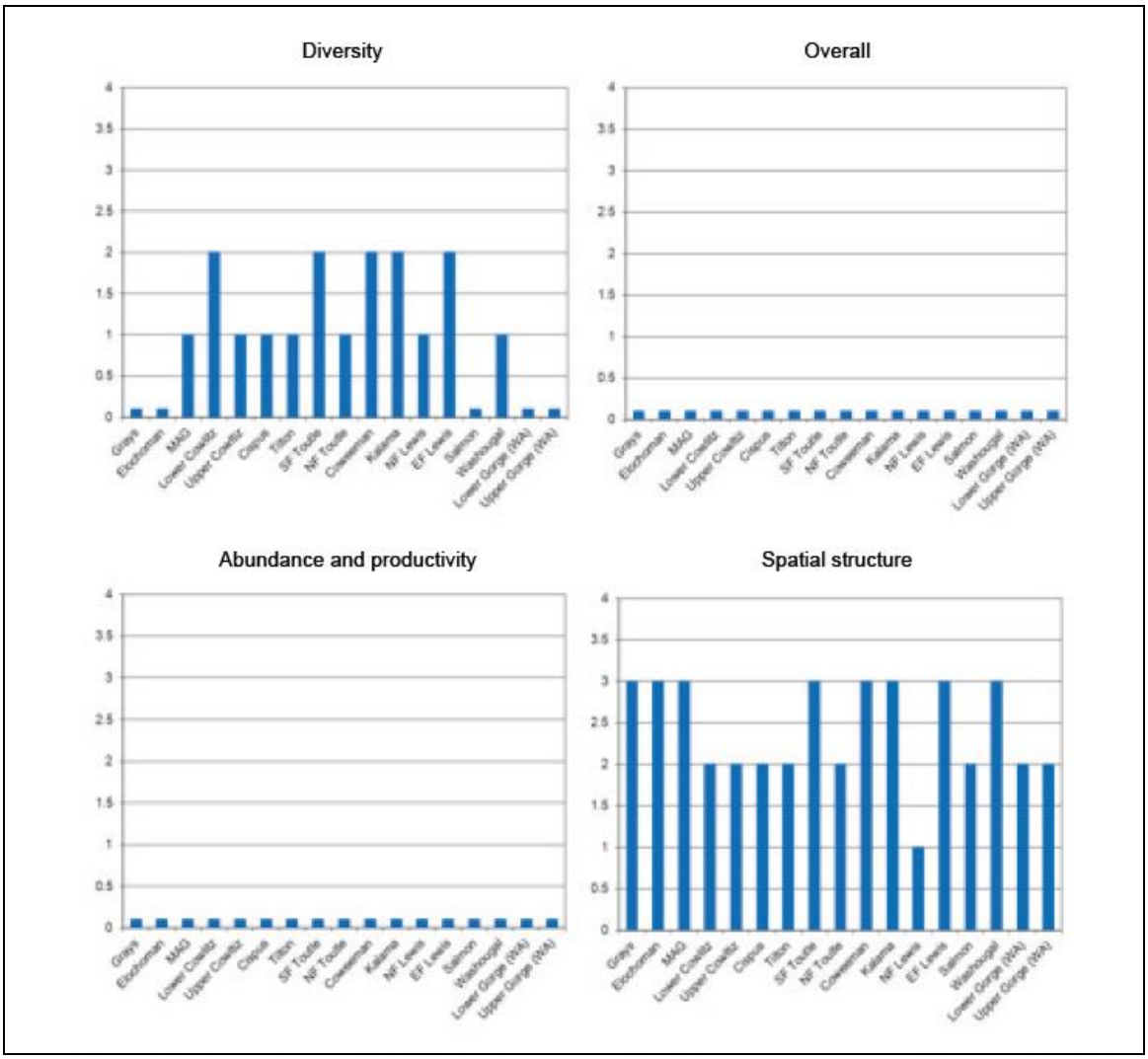

Figure 2.2.2.3: Current status of Washington LCR coho populations for the VSP parameters and overall population risk. (LCFRB 2010 recovery plan, chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

Columbia River chum salmon (*Oncorhynchus keta*). ESU includes all naturally spawned populations of chum salmon in the Columbia River and its tributaries in Washington and Oregon, as well as artificial propagation programs at Grays River and Washougal River/Duncan Creek chum hatchery programs (NMFS 2014 79FR20802).

Status: A report on the population structure of lower Columbia River salmon and steelhead populations was published by the WLC-TRT in 2006 (Myers et al. 2006). The chum population designations in that report are used in this status update and were used for status evaluations in recent recovery plans by ODFW and LCFRB.

The LCFRB completed a revision recovery plan in 2010 that includes Washington populations of Columbia River chum salmon. This plan includes an assessment of the current status of Columbia River chum populations, which relied and built on the viability criteria developed by the WLC-TRT (McElhany et al. 2006) and an earlier evaluation of Oregon WLC populations (McElhany et al. 2007). This evaluation assessed the status of populations with regard to the VSP parameters of A/P, spatial structure, and diversity (McElhany et al. 2000). The result of this analysis is shown in **Figure 2.2.2.4**. The analysis indicates that all of the Washington populations with two exceptions

are in the overall very high risk category (also described as extirpated or nearly so). The Grays River population was considered to be at moderate risk and the Lower Gorge population to be at low risk. The very high risk status assigned to the majority of Washington populations (and all the Oregon populations) reflects the very low abundance observed in these populations (e.g., <10 fish/year) (Ford 2011). Today, 15 of the 17 populations that historically made up this ESU are so depleted that either their baseline probability of persistence is very low or they are extirpated or nearly so; this is the case for all six of the Oregon populations. Currently almost all natural production occurs in just two populations: Grays/Chinook and the Lower Gorge. All three strata in the ESU fall significantly short of the WLC TRT criteria for viability (Dornbush and Sihler 2013).

Table 2.2.2.4: Baseline viability status, viability and abundance objectives, and productivity improvement targets for lower Columbia River chum populations.

		Baseline viability					Prod.	Abundance		
Population	**Contribution**	**A&P**	**S**	**D**	**Net**	**Obj.**	**target**	**Historical**	**Baseline**	**Target**
Coast										
Grays/Chinook [C,G]	Primary	VH	M	H	M[1]	VH	0%[4]	10,000	1,600	1,600
Eloch/Skam [C]	Primary	VL	H	L	VL[2]	H	>500%	16,000	<200	1,300
Mill/Ab/Germ	Primary	VL	H	L	VL	H	>500%	7,000	<100	1,300
Youngs (OR) [C]	Stabilizing[2]	--[3]	--[3]	--[3]	VL	VL	--[3]	--[3]	--[3]	--[3]
Big Creek (OR) [C]	Stabilizing[2]	--[3]	--[3]	--[3]	VL	VL	--[3]	--[3]	--[3]	--[3]
Clatskanie (OR)	Primary[1]	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]
Scappoose (OR)	Primary[1]	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]
Cascade										
Cowlitz (Fall) [C]	Contributing	VL	H	L	VL	M	>500%	195,000	<300	900
Cowlitz (Summer) [C]	Contributing	VL	L	L	VL	M	>500%	n/a	n/a	900
Kalama	Contributing	VL	H	L	VL	M	>500%	20,000	<100	900
Lewis [C]	Primary	VL	H	L	VL	H	>500%	125,000	<100	1,300
Salmon	Stabilizing	VL	L	L	VL	VL	0%	n/a	<100	--
Washougal	Primary	VL	H	L	VL[2]	H+	>500%	18,000	<100	1,300
Clackamas (OR) [C]	Contributing	--[3]	--[3]	--[3]	VL	M	--[3]	--[3]	--[3]	--[3]
Sandy (OR)	Primary	--[3]	--[3]	--[3]	VL	H	--[3]	--[3]	--[3]	--[3]
Gorge										
L. Gorge (WA/OR) [C,G]	Primary	VH	H	VH	H[1]	VH	0%[4]	6,000	2,000	2,000
U. Gorge (WA/OR)	Contributing	VL	L	L	VL	M	>500%	11,000	<50	900

Source: LCFRB 2010.

L = Low; M = Moderate; H = High; VH/E = Very High/Extinct.

[5] Increase relative to interim Plan.

[6] Reduction relative to interim Plan.

[7] Addressed in Oregon Management Unit plan.

[8] Improvement increments are based on abundance and productivity; however, this population will require improvement in spatial structure or diversity to meet recovery objectives.

[C] Designated as a historical core population by the TRT.

[G] Designated as a historical legacy population by the TRT.

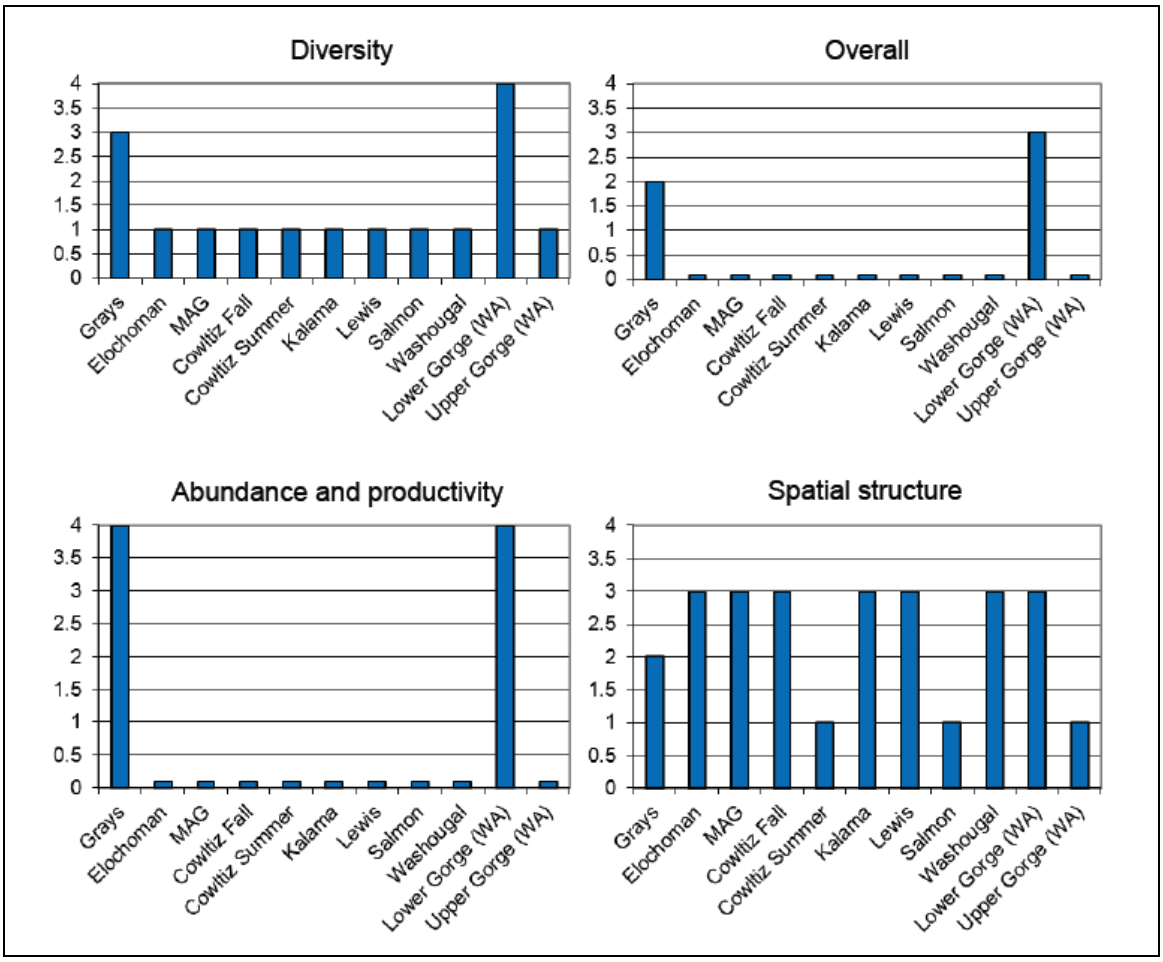

Figure 2.2.2.4: Current status of Washington CR chum populations for the VSP parameters and overall population risk. (LCFRB 2010 Recovery Plan, Chapter 6). A population score of zero indicates a population extirpated or nearly so, a score of 1 is high risk, 2 is moderate risk, 3 is low risk ("viable") and 4 is very low risk (Ford 2011).

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population.

Juvenile coho production estimates is the one measure of production in the Lower Columbia system. See HGMP section 11.1 for planned M&E.

Table 2.2.2.5: Lower Columbia River Washington tributary coho smolt production estimates, 1997-2009 (WDFW, Region 5).

Year	Cedar Creek	Mill Creek	Abernathy Creek	Germany Creek	Cowlitz Falls Dam	Mayfield Dam
1997	-----	-----	-----	-----	3,700	700
1998	38,400	-----	-----	-----	110,000	16,700
1999	28,000	-----	-----	-----	15,100	9,700
2000	20,300	-----	-----	-----	106,900	23,500
2001	24,200	6,300	6,500	8,200	334,700	82,200
2002	35,000	8,200	5,400	4,300	166,800	11,900
2003	36,700	10,500	9,600	6,200	403,600	38,900
2004	37,000	5,700	6,400	5,100	396,200	36,100
2005	58,300	11,400	9,000	4,900	766,100	40,900

2006	46,000	6,700	4,400	2,300	370,000	33,600
2007	29,300	7,000	3,300	2,300	277,400	34,200
2008	36,340	90,97	5,077	3,976	-----	38,917
2009	61,140	62,83	3,761	2,576	-----	29,718
2010	-----	-----	-----	-----	-----	49,171
2011	-----	-----	-----	-----	-----	43,831

Source: LCR FMEP Annual Report 2010 and WDFW Data 2012.

- Provide the most recent 12 year annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Table 2.2.2.6: Spring Chinook salmon total spawner abundance estimates in LCR tributaries, 2000-2012.

Year	Cowlitz	Kalama	Lewis
2000	266	34	523
2001	347	578	754
2002	419	898	498
2003	1,953	790	745
2004	1,877	358	529
2005	405	380	122
2006	783	292	857
2007	74	2,150	264
2008	425	364	40
2009	763	34	80
2010	711	0	160
2011	1,359	26	120
2012	1,359	28	200

Source: Joe Hymer, WDFW Annual Database 2012

Table 2.2.2.7: Fall Chinook salmon total spawner abundance estimates in LCR tributaries, 2000-2011[a].

Year	Elochoman River	Coweeman River[a]	Grays River	Skamokawa Creek	Cowlitz River	Green River (Toutle)	SF Toutle River	Kalama River	EF Lewis River	NF Lewis River	Washougal River
2000	884	424	80	482	2,100	1,580	204	3,877	391	6,504	2,757
2001	230	251	104	3	1,979	1,081	102	3,451	245	4,281	1,704
2002	332	566	390	7	3,038	5,654	216	10,560	441	5,518	2,728
2003	2,204	753	149	529	2,968	2,985	327	9,272	607	11,519	2,678
2004	4,796	1,590	745	2,109	4,621	4,188	618	6,680	918	13,987	10,597
2005	6,820	1,090	387	588	10,329	13,846	140	24,782	727	18,913	3,444
2006	7,581	900	82	372	14,427	7,477	450	18,952	1,375	17,106	6,050
2007	194	140	99	36	2,724	961	30	1,521	308	10,934	2,143
2008	782	95	311	253	1,334	824	45	2,617	236	4,268	3,182
2009	231	147	93	139	2,156	1,302	66	4,356	110	6,112	2,995
2010	1,883	1,330	12	268	2,762	605	NE	3,576	314	8,908	4,529
2011	508	2,148	353	41	1,616	668	NE	10,639	334	14,033	2,961

Source: Ron Roler, WDFW Natural Spawn Progress Reports 2012.
* Estimates of total adult and jack fall Chinook. May include fish put upstream of hatchery weirs.

Table 2.2.2.8: Wild winter steelhead escapement estimates for select SW Washington DPS populations, current WDFW escapement goals and LCSRP abundance targets.

Location	Grays River	Elochoman/ Skamokawa	Mill/Abernathy/ Germany
WDFW Escapement Goal	**1,486**	**853**	**508**
LCSRP Abundance Target	**800**	**600**	**500**
2000	1,064	650	380
2001	1,130	656	458
2002	724	370	354
2003	1,200	668	342
2004	1,132	768	446
2005	396	376	274
2006	718	632	398
2007	724	490	376
2008	764	666	528
2009	568	222	396
2010	422	534	398
2011	318	442	270
3-year average	**436**	**399**	**355**
5-year average	**559**	**471**	**394**
10-year average	**697**	**517**	**378**

Source: WDFW Data 2012

Table 2.2.2.9: Wild winter steelhead escapement estimates for select SW Washington DPS populations, current WDFW escapement goals and LCSRP abundance targets.

Location	Coweeman	SF Toutle	NF Toutle/ Green	Kalama	EF Lewis	Washougal
WDFW Escapement Goal	**1,064**	**1,058**	**NA**	**1,000**	**1,243**	**520**
LCSRP Abundance Target	**500**	**600**	**600**	**600**	**500**	**350**
2000	530	490	----	921	NA	NA
2001	384	348	----	1,042	377	216
2002	298	640	----	1,495	292	286
2003	460	1,510	----	1,815	532	764
2004	722	1,212	----	2,400	1,298	1,114
2005	370	520	388	1,856	246	320
2006	372	656	892	1,724	458	524
2007	384	548	565	1,050	448	632
2008	722	412	650	776	548	732
2009	602	498	699	1,044	688	418
2010	528	274	508	961	336	232
2011	408	210	416	622	308	204
3-year average	**513**	**327**	**541**	**876**	**444**	**285**
5-year average	**529**	**388**	**568**	**891**	**466**	**444**
10-year average	**487**	**648**	***588**	**1,374**	**515**	**523**

Source: WDFW Data 2012.
* 7-year average for NF Toutle/Green.

Table 2.2.2.10: Wild summer steelhead population estimates for LCR populations from 2001 to 2011, current WDFW escapement goals, and LCSRP abundance targets.

Location	Kalama	EF Lewis	Washougal	Wind
WDFW Escapement Goal	**1,000**	**NA**	**NA**	**1,557**
LCSRP Abundance Target	**500**	**500**	**500**	**1,000**
2001	286	271	184	457
2002	454	440	404	680
2003	817	910	607	1,096
2004	632	425	NA	861
2005	400	673	608	587
2006	387	560	636	632
2007	361	412	681	737
2008	237	365	755	614
2009	308	800	433	580
2010	370	602	787	788
2011	534	1,084*	956*	1,468
3-year average	**404**	**829**	**725**	**945**
5-year average	**362**	**653**	**722**	**837**
10-year average	**450**	**627**	**652**	**804**

Source: WDFW Data 2012.
* Preliminary estimates.

Table 2.2.2.11: Population estimates of chum salmon in the Columbia River.

Location	2002	2003	2004	2005	2006	2007	2008	2009	2010[a]	2011[a]
Crazy Johnson Creek	---	---	966	1,471	3,639	759	1,034	981	677	2,374
WF Grays River	---	---	9,015	1,324	1,232	1,909	800	994	1,967	7,002
Mainstem Grays River	---	---	4,872	1,400	1,244	1,164	886	750	3,467	1,848
I-205 area	3,468	2,844	2,102	1,009	862	544	626	1,132	2,105	4,947
Multnomah area	1,267	1,130	665	211	313	115	28	102	427	641
St Cloud area	---	137	104	92	173	9	1	14	99	509
Horsetail area	---	---	106	40	63	17	33	6	45	183
Ives area[b]	4,466	1,942	363	263	387	145	168	141	214	162
Duncan Creek[c]	13	16	2	7	42	9	2	26	48	85
Hardy Creek	343	392	49	73	104	14	3	39	137	173
Hamilton Creek	1,000	500	222	174	246	79	114	115	247	517
Hamilton Spring Channel	794	363	346	84	236	44	109	91	187	324
Grays return[d]	12,041	16,974	15,157	4,327	6,232	3,966	2,807	2,833	6,399	11,518
I-205 to Bonneville return	11,351	7,324	3,959	1,953	2,426	976	1,084	1,666	3,509	7,541
Lower Columbia River Total	23,392	24,298	19,116	6,280	8,658	4,942	3,891	4,499	9,908	19,059

Source: Todd Hillson - WDFW Chum Program 2012

[a] Data for 2010 and 2011 is preliminary.

[b] Ives area counts are the carcass tagging estimate plus fish removed for broodstock, except for 2007 and 2008, which is area under the curve.

[c] Totals for Duncan Creek do not include broodstock brought in from mainstem spawning areas, adult trap catch or surveys below monitoring weirs only..

[d] Grays return totals include natural spawners and removed for broodstock.

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

The proportion of hatchery-origin spawners (pHOS) should be less than 30% of the naturally spawning population for the integrated on-station program per HSRG guidelines (2009). pHOS estimates from 2013 are 0.06 for this program. See HGMP section 11.1 for planned M&E.

2.2.3 Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of NMFS listed fish in the target area, and provide estimated annual levels of take.

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

Broodstock Program:

Broodstock Collection: A river-spanning resistance board weir (RBW) was installed in 2011 to facilitate annual fall/winter collection/management/monitoring of returning adult salmonids. This is the primary broodstock collection site, and will primarily be focused on fall Chinook management; however, information gathered from other returning salmonids (chum, coho, and steelhead) will also be used to improve monitoring and management when possible.

Because this is an integrated program, 30% of the broodstock will come from natural-origin spawners. Natural-origin spawners in excess of weekly needs will be passed upstream.

Genetic introgression: When hatchery and wild salmon interbreed, genetic material is exchanged between both groups. Mass-marking enables known levels of integration. Indirect "take" from genetic introgression is unknown. Indirect take from genetic introgression is unknown.

Rearing Program:

Operation of Hatchery Facilities: Facility operation impacts include water withdrawal, effluent, and intake compliance. Effluent at outfall areas is rapidly diluted with mainstem flows and operation is within permitted NPDES guidelines (see HGMP sections 4.1 and 4.2).

Washougal Hatchery withdraws water from the river at one locations (see HGMP section 4.1), which can reduce low flows in late-summer and early-fall from the sections between the intake to where the non-consumptive water rejoins the river (a distance of 0.5 mile) (Mitchell Act Hatcheries Intake and Passage Study -April 2002).

Indirect take from this program is unknown.

Disease: Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of the hatchery programs. *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*-Chapter 5 (IHOT 1995) have been instrumental in reducing disease outbreaks. Although pathogens occur in the wild and fish might be affected, they are believed to go undetected with predation quickly removing those fish.

In addition, although pathogens may cause post release mortality in fish from hatcheries, there is little evidence that hatchery origin fish routinely infect natural populations of salmon and steelhead in the Pacific Northwest (Enhancement Planning Team 1986 and Steward and Bjornn 1990). Prior to release, the hatchery population health and condition is established by the Area Fish Health Specialist. This is commonly done one to three weeks pre-release, and up to six weeks on systems with pathogen-free water and little or no history of disease. Indirect take from disease is unknown.

Release:

Hatchery Production/Density-Dependent Effects-onstation releases: Hatcheries can release numbers of fish that can exceed the density of the natural productivity in a limited area for a short period of time and can compete with listed fish. Washougal Type-N coho releases have were reduce from 500,000 to 150,000 in 2009. They are mass-marked to provide intensive select fisheries and provide protection for listed fish. Hatchery fish are released as active smolts that will emigrate quickly from the system. In addition, fish are released from the hatchery over a period of ten days to two weeks in order to minimize density effects. This strategy allows groups to emigrate and move from the area daily. Indirect take from density dependent effects is unknown.

Hatchery Production/Density-Dependent Effects-Klickitat releases: Up to 3.5-million coho are released annually (1 million from Klickitat, 2.5-million from Washougal). This off-station (Washougal stock) plant occurs earlier in the year and at lower locations of the river than the on-station release from Klickitat Hatchery, and could be well dispersed from the system by that time (see also Klickitat Complex Coho HGMP). They are mass-marked to provide intensive mark-select fisheries and provide protection for listed fish. Indirect take from density dependent effects is unknown.

Potential Washougal Hatchery coho predation and competition effects on listed salmonids and eulachon: The proposed annual on-station production goal for this program is 150,000 yearlings. Smolts are released at 15 fpp (146 mm fl) in May/June (see HGMP section 10.3). Due to size differences between listed yearling and sub-yearling smolts (**2.2.3.1**), competition is unlikely, with different prey items and habitat preferences.

The proposed annual production goal for the Klickitat off-station releases is 2.5 million yearlings. As fish are directly planted into the lower river to increase migration rates from the system. The Klickitat River is a fast flowing river system that could help with migration rates. Smolts are released at 20 fpp (133 mm fl) in April.

Indirect take from predation and competition is unknown.

Table 2.2.3.1: Peak migration timing and average fork length (mm) of out-migrant juvenile Chinook, coho and steelhead captured in rotary screw traps on Mill, Germany and Abernathy creek, Lower Columbia River, 2008.

Stream	Chinook		Coho		Steelhead	
	Avg Size (mm)	Peak Migration	Avg Size (mm)	Peak Migration	Avg Size (mm)	Peak Migration
Mill Cr	37.0	Mar 10-Apr 13	104.2	Mar 17-23	154.5	Apr 28-May 4
Germany Cr	39.8	Mar 17-23	115.3	May 19-25	177.8	May 12-18
Abernathy Cr	37.9	Mar 31 – Apr 6	112.1	May 19-25	163.8	May 12-18

Source: Kinsel et al 2009.

Both juvenile and adult salmonids have been documented to feed on eulachon (Gustafson et al. 2010). Predation of eulachon by coho reared in this program may occur, however it is unknown to what degree such predation may occur.

Residualism: To maximize smolting characteristics and minimize residualism, WDFW adheres to a combination of acclimation, release strategies, size, and time guidelines.

- Condition factors, standard deviation and co-efficient of variation (CV) are measured throughout the rearing cycle and at release.
- Feeding rates and regimes throughout the rearing cycle are programmed to satiation feeding to minimize out-of-size fish and programmed to produce smolt size fish at date of release.
- Based on past history, fish have reached a size and condition that indicates a smolted condition at release.
- Releases occur within known time periods of species emigration from acclimated ponds.

Monitoring:

Associated monitoring Activities:

WDFW has implemented an expanded monitoring program for Chinook, coho, chum and steelhead populations in the Lower Columbia River (LCR) region of Southwest Washington (WDFW's Region 5) and fishery monitoring in the lower mainstem of the Columbia River. The focus of this expanded monitoring is to 1) gather data on Viable Salmonid Population (VSP) parameters – spawner abundance, including proportion of hatchery-origin spawners (pHOS), spatial distribution, diversity, and productivity, 2) to increase the coded wire tag (CWT) recovery rate from spawning grounds to meet regional standards, and 3) to evaluate the use of PIT tags to develop harvest rates for salmon and steelhead populations. Additionally, key watersheds are monitored for juvenile salmonid out-migrant abundance. Coupled with adult abundance information, these data sets allow for evaluation of freshwater productivity and development of biological reference points, such as seeding capacity. Monitoring protocols and analysis methods utilized are intended to produce unbiased estimates with measurements of precision in an effort to meet NOAA monitoring guidelines (Crawford and Rumsey 2009).

- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.

Table 2.2.3.2: Disposition of wild coho returning to the Washougal River RBW, 2011-2013.

Brood Year	Mortality
2011	0
2012	0
2013	0

Source: WDFW Hatchery Headquarters Database 2014.

- Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

See "take" tables at the end of this HGMP.

- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

No situations are expected to occur where take would exceed ESA limits. If significant numbers of wild salmonids are observed impacted by this operation, then staff would inform the WDFW District Biologist, Fish Health Specialist or Area Habitat Biologist who, along with the Hatchery Complex Manager, would determine an appropriate plan and consult with NOAA-NMFS for adaptive management review and protocols.

Handling and release of wild coho in broodstock trapping operations is monitored and take observations have been rare. Any additionally mortality from this operation on a yearly basis would be communicated to Fish program staff for additional guidance.

3 SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. Hood Canal Summer Chum Conservation Initiative) or other regionally accepted policies (e.g. the NPPC Annual Production Review Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

WDFW has several policies/plans that help inform management decisions regarding the HGMPs currently under review. These policies include:

1. Hatchery and Fishery Reform Policy (Commission Policy C3619)
2. The Conservation and Sustainable Fisheries Plan (draft)
3. The Hatchery Action Implementation Plans (HAIP)
4. Lower Columbia Salmon Recovery Plan (LCSRP)

Descriptions of these policies and excerpts are shown below:

Policies/Plans – Key Excerpts

Hatchery and Fishery Reform Policy: Washington Department of Fish and Wildlife Commission Policy C-3619. WDFW adopted the Hatchery and Fishery Reform Policy C-3619 in 2009. Its purpose is to advance the conservation and recovery of wild salmon and steelhead by promoting and guiding the implementation of hatchery reform. The intent of hatchery reform is to improve hatchery effectiveness, ensure compatibility between hatchery production and salmon recovery plans and rebuilding programs, and support sustainable fisheries. WDFW Policy C-3619 works to promote the conservation and recovery of wild salmon and steelhead and provide fishery-related benefits by establishing clear goals for each state hatchery, conducting scientifically defensible-operations, and using informed decision making to improve management. It is recognized that many state operated hatcheries are subject to provisions under *U.S. v Washington* (1974) and *U.S. v Oregon* and that hatchery reform actions must be done in close coordination with tribal co-managers. Washington Fish and Wildlife Commission Policy: POL-C3619.

Guidelines from the policy include:

1. Use the principles, standards, and recommendations of the Hatchery Scientific Review Group (HSRG) to guide the management of hatcheries operated by the Department.

2. Develop watershed-specific action plans that systematically implement hatchery reform as part of a comprehensive, integrated (All-H) strategy for meeting conservation and harvest goals at the watershed and Evolutionarily Significant Unit (ESU)/Distinct Population Segment (DPS) levels. Action Plans will include development of stock (watershed) specific population designations and application of HSRG broodstock management standards.

Conservation and Sustainable Fisheries Plan (*CSFP*)*:* The CSFP is a draft plan that has been developed to meet WDFW's responsibilities outlined in the Lower Columbia Salmon Recovery Plan (LCSRP) and address the HSRG suggested solutions and achieve HRSG standards for primary, contributing and stabilizing populations. The plan describes the implementation of changes to hatchery and harvest programs and how they assist in recovery and achieve HSRG guidelines. The draft plan also identifies Viable Salmonid Population (VSP) parameters that will be addressed.

Hatchery Action Implementation Plans (*HAIP*)*:* The HAIPs illustrate how WDFW is implementing hatchery programs to incorporate the HSRG guidelines. The plans provide the current programs and explain the future goals.

Lower Columbia Salmon Recovery Plan (*LCSRP*)*:* Some sub-basins will be free of hatchery influence and hatchery programs. In other sub-basins, hatchery programs will serve specific conservation and harvest purposes consistent with goals for naturally-spawning populations. The mosaic of programs is designed to ensure that overall each DPS will be naturally self-sustaining.

Strategies:

1. Reconfigure production-based hatchery programs to minimize impacts on natural populations and complement recovery objectives.
2. Adaptively manage hatcheries to respond to future knowledge, enhance natural production, and improve operational efficiencies.

Mitchell Act: This program receives Mitchell Act Funding. Initially passed in 1938, the Mitchell Act is intended to help rebuild and conserve the fish runs, and mitigate the impacts to fish from water diversions, dams on the mainstem of the Columbia River, pollution and logging. The Mitchell Act specifically directs establishment of salmon hatcheries, conduct of engineering and biological surveys and experiments, and installing fish protective devices. It also authorizes agreements with State fishery agencies and construction of facilities on State-owned lands. NMFS has administered the program as of 1970. There are 15 Mitchell Act hatcheries in Washington State; the majority of which are below Bonneville Dam.

The Mitchell Act programs are intended to support Northwest fishing economies – particularly coastal and Native American -- that have relied on Columbia River production both before and after dam construction. Catches of hatchery fish sustain the economies of local communities while keeping incidental mortalities of ESA-Listed fish at approved levels. Value of hatchery production and benefit to local economies will be further increased by implementing fisheries that increase harvest of hatchery produced fish, as expected through implementation of the LCSRP.

3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

Future Brood Document. Hatchery salmon and steelhead production levels are detailed in the annual Future Brood Document, a pre-season planning document for fish hatchery production in Washington State for the upcoming brood stock collection and fish rearing season (July 1 – June 30).

See also HGMP section 3.1.

3.3 Relationship to harvest objectives.

Total annual harvest is dependent on management response to annual abundance in Pacific Salmon Commission (PSC - U.S./Canada), Pacific Fishery Management Council (PFMC - U.S. ocean), and Columbia River Compact forums. WDFW also has received authorization for tributary, Columbia River mainstem, and ocean fisheries; the combined harvest rates in the *Fisheries Management and Evaluation Plan* (FMEP), *Columbia River Fish Management Plan* (CRFMP), and ocean fisheries are reviewed annually in the North of Falcon process.

3.3.1 Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

Hatchery coho can contribute significantly to the lower Columbia River gill net fishery; commercial harvest of early coho is constrained by fall Chinook and Sandy River coho management; commercial harvest of late coho is focused in October during the peak abundance of hatchery late coho. A substantial estuary sport fishery exists between Buoy 10 and the Astoria-Megler Bridge; majority of the catch is early hatchery coho, but late hatchery coho harvest can also be substantial.

Table 3.3.1.1: Washougal River Hatchery Type-N Coho Fishery Contributions.

Brood Years: 2000-2009 Fishery Years: 2003-2012		
		Average SAR%[a] 1.61
Agency	**Non-WA Fishery**	*% of total Survival*
CDFO	All	1.35
Agency	**OR Fishery**	*% of total Survival*
ODFW	10- Ocean Troll	1.63
ODFW	21- Columbia R. Gillnet	12.82
ODFW	40- Ocean Sport	9.18
ODFW	44- Columbia R. Sport	3.16
ODFW	45- Estuarine Sport-(bouy 10)	1.07
ODFW	50- Hatchery Escapement	0.17
ODFW	72- Juvenile Sampling	0.04
Agency	**WA Fishery**	*% of total Survival*
WDFW	10- Ocean Troll	0.71
WDFW	15- Treaty Troll	1.07
WDFW	22- Coastal Gillnet	0.21
WDFW	23- PS Net	0.06
WDFW	40- Ocean Sport	0.16
WDFW	41- Ocean Sport- Charter	7.10
WDFW	42- Ocean Sport- Private	12.48
WDFW	43- Jetty Sport	0.08
WDFW	45- Estuarine Sport	0.46
WDFW	46- Freshwater Sport[b]	0.27
FWS	50- Hatchery Escapement	0.02
WDFW	50- Hatchery Escapement	46.89
WDFW	50- Hatchery Escapement (Strays)	1.61
	Total	*100.00*

[a] Average SAR% = (tags recovered/tags released)

[b] Freshwater Sport based on WDFW Catch Record Card (CRC) data

[c] Strays recovered at Bonneville, Little White Salmon, Sandy River, Marblemount, George Adams and

Skamania Hatchery

Source: RMIS 2014.

3.4 Relationship to habitat protection and recovery strategies.

Lower Columbia:

The following processes have included habitat identification problems, priority fixes and evolved as key components to *The Lower Columbia Salmon Recovery and Fish and Wildlife Sub-basin Plans* (Volume 1; Clark, Cowlitz, Lewis, Skamania and Wahkiakum Counties, December 15, 2004).

Sub-Basin Planning - Regional sub-basin planning processes include the Draft Washougal River Sub-basin Summary (May 17, 2002) which was prepared for the Northwest Power Planning Council. The Sub-basin efforts provided initial building blocks for the The Lower Columbia fish Recovery Board (LCFRB) regional recovery plan. The LCFRB has adopted the *Lower Columbia Salmon Recovery and Fish and Wildlife Sub-basin Plans* (Volume 1; Clark, Cowlitz, Lewis, Skamania and Wahkiakum Counties, December 15, 2004) with the understanding that Implementation of the schedule and actions for local jurisdictions depends upon funding and other resources.

Habitat Treatment and Protection - Ecosystem Diagnosis and Treatment (EDT) compares habitat today to that of the basin in a historically unmodified state. WDFW is also conducting a Salmon Steelhead Habitat Inventory Assessment Program (SSHIAP), which documents barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

Limiting Factors Analysis (LFA) - A WRIA 28 LFA was conducted by the Washington State Conservation Commission (May 2002). Major impacts include fish habitat degradation from the upper Washougal River system reaches downstream to the mouth in Camas. The Yacolt Burn deforested large tracts of land in the upper reaches causing an increase in sediment transport, a reduction in hydrologic retention, and a general decline in habitat quality. Gravel extraction in the lower 20 miles of the river has caused a loss in suitable spawning substrate through this reach. Water quality remains a problem and the Washougal River is listed on the 303d list (WDOE) along with several of its' tributaries.

Mid-Columbia:

Klickitat Sub-basin Recovery Plan for the Mid Columbia ESU - This plan provides habitat strategies to be used to recover ESA-listed steelhead in the Klickitat Subbasin. The hatchery program has considered current and future habitat conditions in sizing program and defining release locations.

Klickitat River Anadromous Fisheries Master Plan (2008) describes actions needed to protect and restore stream habitat in the Klickitat River as well as the basis for hatchery operations.

Yakama Nation Fisheries Program (*YNFP*): The Lower Klickitat Riparian and In-Channel Habitat Enhancement Project is a BPA-funded watershed restoration project implemented by the Yakama Nation Fisheries Program (YNFP). The YNFP is working in coordination with WDFW, Natural Resources Conservation Service (NRCS), and the Central Klickitat Conservation District. The project was proposed under the Northwest Power Planning Council's Fish and Wildlife Program and funded by BPA in 1997. Initial project restoration projects were located within the Swale Creek and Little Klickitat River watersheds. Included in the project scope of work are in-stream structural modifications, re-vegetation of the riparian corridor, construction of sediment retention ponds to provide late-season flow to the creek and exclusion fencing to prevent channel degradation from livestock. A monitoring program has been initiated to document project success

and guide future restoration activities. The second phase of the project will use EDT modeling output to guide and prioritization restoration activities.

3.5 Ecological interactions.

(1) *Salmonid and non-salmonid fishes or species that could negatively impact the program:* Outmigrant hatchery fish can be preyed upon through the entire migration corridor from the river sub-basin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays, as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons in the Columbia mainstem sloughs, can prey on coho smolts. Mammals that can take a heavy toll on migrating smolts and returning adults include: harbor seals, sea lions, river otters and orcas

(2) *Salmonid and non-salmonid fishes or species that could be negatively impacted by the program:* Co-occurring natural salmon and steelhead populations in local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run Chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted through a complex web of short and long term processes and over multiple time periods which makes evaluation of this a net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon. In addition the program may have unknown impacts on eulachon populations in the basin.

(3) *Salmonid and non-salmonid fishes or other species that could positively impact the program.* Multiple programs including fall Chinook, coho and steelhead programs are released from the Washougal Hatchery and limited natural production of Chinook, coho, chum and steelhead occurs in this system along with non-salmonid fishes (sculpins, lampreys and sucker etc.).

(4) *Salmonid and non-salmonid fishes or species that could be positively impacted by the program.* Coho smolts can be preyed upon release thru the entire migration corridor from the river sub-basin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can prey on coho smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that benefit from migrating smolts and returning adults include: harbor seals, sea lions, river otters and orcas. Except for yearling coho and steelhead, these species may serve as prey items during the emigration through the basin. Hatchery fish provide an additional food source to natural predators that might otherwise consume listed fish and may overwhelm established predators providing a beneficial, protective effect to co-occurring wild fish. Hatchery releases can also behaviorally encourage mass emigration of multiple species through the watershed, reducing residency. Many watersheds in the Pacific Northwest appear to be nutrient-limited (Gregory et al. 1987; Kline et al. 1997) and salmonid carcasses can be an important source of marine derived nutrients (Levy 1997). Carcasses from returning adult salmonids have been found to elevate stream productivity through several pathways, including:

   a) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998);
   b) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and
   c) Juvenile salmonids have been observed to feed directly on carcasses (Bilby et al. 1996).

4 SECTION 4. WATER SOURCE

4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

Table 4.1.1: Water sources for Washougal Hatchery.

Water Source	Water Right		Available Water Flow	Avg Water Temp. (ºF)	Usage	Limitations
	Record/Cert. No.	Permit No.				
Washougal River (surface)	S2-*13405C WRIS/ 07058	10084	10.0 cfs	48.7	Rearing	Limited water during summer months due to low flows. Temps in lower river can reach the 70s in the summer.
	S2-25274C WRIS	----	12.0 cfs			
Boyle Cr. (spring water)	S2-CV2P694/ 07316	07327	5.5 cfs	49.3	Rearing	Limited water during summer months due to low flows.
Bob Creek (surface)	S2-*09760CWRIS/ 07314	07325	3.0 cfs	48.9	Rearing, incubation	None. Not used for incubation in the summer.

Source: Phinney 2006, WDOE Water Resources Explorer 2014, WDFW hatchery data.

Water rights total 15,061 gpm from four sources.

Four electric pumps deliver river water to the hatchery at 1,600 gpm each from intakes on the Washougal River. Two turbine-driven pumps can also provide water at up to 2,000 gpm each; the turbine pumps provided up to 700 gpm prior to replacement in 2012. An emergency generator located in the pump house can run the electric pumps in case of power outage. During lower-use periods (November/December), the river intake supplies 3,500 gpm (7.8 cfs); from March through August, use increases to 7,500 gpm (16.7 cfs).

Spring water from Boyles Creek, located approximately 68.6 m from the hatchery, supplies 2,300 gpm (5.1 cfs) non-turbid and minimal silt-laden water to the hatchery during high flow river events and is used for ponds 13 thru 24 as well as 27 for fall Chinook rearing. Since this is a short stream from a spring source, the agency has determined there are no fish populations within this stretch and does not need a screen intake. A gravity intake on Bob Creek is located 0.54 km from the grounds and supplies 2.5 cfs for incubation. Water temperature stays constant year-round (see **Table 9.2.2**), and it is not used for incubation in the summer months. "C-Creek", another small spring source, is no longer used (Richard Johnson, pers. comm., 2004).

During summer, water from the river intake reflects elevated temperatures. Water temperature data collected at the Washougal Salmon Hatchery between 1987 and 1991 also documents high water temperatures in the upper Washougal basin. During this five-year recording period, water temperatures at the hatchery frequently exceeded 17.8°C during July, August and September; in some cases for as long as 17 days in a row (see also **Table 9.2.2**).

Water rights were obtained in 1950.

NPDES Permits:

These facilities operate under the "*Upland Fin-Fish Hatching and Rearing*" *National Pollution Discharge Elimination System* (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE).

Discharges from the cleaning treatment system are monitored as follows:

- *Total Suspended Solids* (*TSS*) 1 to 2 times per month on composite effluent, maximum effluent and influent samples.
- *Settleable Solids* (*SS*) 1 to 2 times per week on effluent and influent samples.
- *In-hatchery Water Temperature* - daily maximum and minimum readings.

Table 4.1.2: Record of NPDES permit compliance.

Facility/ Permit #	Reports Submitted Y/N			Last Inspection Date	Violations Last 5 yrs	Corrective Actions Y/N	Meets Compliance Y/N
	Monthly	Qtrly	Annual				
Washougal WAG13-1026	Y	Y	Y	07/25/2012	0	N	Y

Source: Ann West, WDFW Hatcheries Headquarters Database 2014.

4.2 Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Intake structures were designed and constructed to specifications at the time the Washougal facility was built. The *Mitchell Act Intake and Screening Assessment* (2002) has determined that the intake screens and velocity at Washougal Hatchery are not compliant with NOAA fish screening standards. The allowable velocity of 0.40 fps is exceeded and the backup pump is too close to the screen area, causing high approach velocities. WDFW has requested funding for future scoping, design, and construction work of a new intake system.

Feeder creek streams are spring-fed and determined to be non-fish bearing streams, therefore, of no impact. Due to the steep elevation and grade, the stream is a natural barrier to fish and Bob Creek in not a fish-bearing stream.

5 SECTION 5. FACILITIES

5.1 Broodstock collection facilities (or methods).

Coho broodstock are collected at the Washougal Hatchery weir. The rack at the fishway is installed in August and removed in February. Adult coho recruit to the fish ladder and then are counted from the trap daily into the adult pond (see HGMP section 5.3). A bypass structure was installed at the base of the fish ladder in 2011, to allow fish to pass upstream without having to recruit to the adult holding pond.

WDFW has operated a resistance board weir (RBW) in the mainstem Washougal, located at approximately at RKm 22.0 (RM 13.7), since 2011 (see Washougal Fall Chinook HGMP). The RBW captures 100% of the upstream-migrants (except during some high flow events), and is generally operated from August 1 through October 31; however, it is not used to collect coho broodstock. All coho and steelhead encountered at the RBW are passed above the trap.

5.2 Fish transportation equipment (description of pen, tank truck, or container used).

Table 5.2.1: Transportation equipment available.

Equipment Type	Capacity (gallons)	Supp. Oxygen (y/n)	Temp. Control (y/n)	Norm. Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Tanker Truck	1,800	Y	N	100	Sodium Chloride (Salt)	5,000 ppm (~0.5%)
Tanker Truck	1,000	Y	N	100	Sodium Chloride (Salt)	5,000 ppm (~0.5%)

Adults are not transported for this program.

Klickitat program yearlings are transported by truck for direct release into the Klickitat River at RKm 18. Average transport time is around 1 hour and 40 minutes.

5.3 Broodstock holding and spawning facilities.

Table 5.3.1: Broodstock holding and spawning facilities available.

Type	Units (number)	Volume (cu.ft.)	Size (ft)			Flow (gpm)
			Length	Width	Depth	
Asphalt Adult holding pond	1	100,825	185	109	5	11,225

Integrated Hatchery Operations Team (IHOT) adult holding guidelines are followed for adult holding, density, water quality and alarm systems. Adults are seined, sorted, killed and spawned directly from the adult holding pond. Fish not ready to spawn are returned to the pond for further maturation. Spawning for this program takes place in a covered area.

5.4 Incubation facilities.

Table 5.4.1: Incubation vessels available.

Type	Units (number)	Size			Flow (gpm)	Volume (cu.ft.)	Loading (eggs/unit)
		Length	Width	Depth			
Vertical Stack Tray Units (16 trays/stack)	72 (1,152 trays)	24-in	25-in	4-in	3-5	0.55/tray	8,000
Fiberglass DeepTroughs w/ cell baffles (9-cells/trough)	4	14-ft	3-ft	25-in	8-12	87	1,000,000

Fertilized eggs are incubated in the deep troughs until eyed, then moved to vertical stack incubators for hatching. Water source is from Bob Creek (spring water).

5.5 Rearing facilities.

Table 5.5.1: Rearing facilities available.

Pond Type	Units (No.)	Volume (cu.ft)	Size			Flow (gpm)	Max. Flow Index	Max. Density Index
			Length (ft.)	Width (ft.)	Depth (ft.)			
Concrete Raceways	12	4,800	80	20.0	3.0	265	2.69	0.17
Concrete Raceways	12	8,300	135	17.5	3.5	320	2.10	0.068
Concrete Rearing Pond	1	85,500	475	40	4.5	11,000	2.26	0.26

Earthen pond 27 was modified to a concrete rearing pond (475 ft x 40 ft x 4.5 ft) in 2010, to help reduce loading densities.

5.6 Acclimation/release facilities.

Fish are released on-site (see HGMP section 5.5) directly to the river.

5.7 Describe operational difficulties or disasters that led to significant fish mortality.

Program has experienced operational difficulties during drought events, which caused problems in water availability and quality (temperature). Icing and slushing problems during the winter within the ponds can be a problem. Otherwise, the facility does not experience abnormal operational difficulties.

5.8 Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

- All pumps, broodstock holding, incubation and rearing receptacles have water loss alarms.
- One main river pump is kept specifically as a back-up in case of mechanical failure.
- Backup generator system is automatic in case of power loss.
- Multiple water sources (Boyles and Bob Creeks) are gravity-fed and can be used in case of total power and/or backup generator failure.
- Staff is available 24/7 to respond to pump failure, water loss, and flooding events.
- Aeration pumps are used to maximize the water conditions in the adult collection pond during periods of low water quality which benefits fish held until sorting can be accomplished.
- Fish health protocols through broodstock collection, incubation and rearing phases are followed and monitored monthly.
- Broodstock collection is checked daily for program and listed fish.
- Staff monitors the trap operation daily to keep the numbers of fish stacking in the trap area to manageable volumes. Heavy volumes can create density problems for listed fish if they are not removed expeditiously.

6 SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1 Source.

Broodstock was derived from adults volitionally returning to the Washougal Hatchery. Program egg-take goals have been met in most years, except in 1993, 2011 and 2012; the shortfall was filled with eggs from Lewis River stock. The use of natural-origin fish (adipose fin present) will be maximized to allow for the integration of the on-station program only.

6.2 Supporting information.

6.2.1 History.

Acceptable stocks were from any lower river “Type-N” coho. The stock used most often for the 2,500,000 smolt program to the Klickitat River for supplementing the Washougal needs is the Lewis River “Type N”. These stocks originally originated from the Cowlitz “Late” (Type-N) stock coho, and were introduced to the Washougal Hatchery in 1985. Prior to 1985, the Washougal coho program was "Early" (Type-S) stock coho with history from the Washougal River beginning in 1958-1959. The hatchery program was initiated with local stocks and some imported Toutle "Early" stock coho in 1958-1959. In 1985, “Late” stock coho were introduced from the Cowlitz Salmon Hatchery. Since that time most years production has been a composite of late-run Washougal and Lewis River Type-N Coho.

Table 6.2.1.1: Broodstock origin of Washougal Type-N Coho program.

Broodstock Source	Origin	Year(s) Used	
		Begin	End
Cowlitz Hatchery Type N Coho	H	1985	
Washougal Hatchery Type N Coho	H	1999	Present
Lewis River Hatchery Type N Coho	H	1995	

Kalama River Hatchery Type N Coho	H	1999	
Elochoman Hatchery Type N Coho	H	1999	

6.2.2 Annual size.

Up to 2,150 adults at a 1:1 male to female ratio, as the escapement allows; jacks will be included at a minimum of 5% of the total spawning population. This is based on a an average fecudity of 3,200 eggs/female, and a 10% pre-spawning mortality. Collected broodstock supports the 150,000 yearling coho on-station release, and 2,500,000 yearlings for the Klickitat River out-plant portion. Washougal has been able to meet escapement for this system in most years (2,150 adults) since 2001.

6.2.3 Past and proposed level of natural fish in broodstock.

The level of natural fish in the returning broodstock is unknown prior to 1998 and integrated within the spawning population. Since that time only hatchery-origin broodstock identified by their missing adipose fin have been used for propagation purposes. The use of natural-origin fish (adipose fin present) will be maximized in the future to allow for the integration of this program. See **Table 7.4.2.2.** for unmarked fish used for the on-station integrated program brood.

6.2.4 Genetic or ecological differences.

There are no known genotypic, phenotypic or behavioral differences between the hatchery and natural stocks in the Washougal drainage. The broodstock chosen displays morphological and life history traits similar to the natural population. Large numbers of coho are released from integrated programs in the Washington tributaries in the lower Columbia province (Lewis, Cowlitz, Washougal rivers) and are expected to contribute to natural populations.

6.2.5 Reasons for choosing.

Washougal releases. The stock has a run entry pattern and timing that provides harvest opportunities for fisheries in the sub-basin, the lower Columbia mainstem/tributaries and Washington coast. The stock is the strength of the Columbia River contribution to the Washington coastal fisheries especially in zones 1 & 2 (Illwaco, Westport). Combination of Type-N and Type-S stocks provide an extended period of quality catch in both the fresh water recreational and commercial fisheries. The stock provides the fresh water commercial fishers and opportunity (timing) outside the peak fall Chinook returns in the lower Columbia River. Combined with other Type-N coho programs, they provide an extended period of quality catch in both the freshwater recreational and commercial fisheries.

Klickitat releases. These plants began in 1988 and are to be made in addition to the existing Klickitat Hatchery program. The broodstock chosen has the desired life history traits to meet harvest goals as late coho have the advantage of extending the period of fishing opportunity. As with fall chinook, coded-wire-tag data indicates that most of the coho adults originating from Klickitat Hatchery are harvested before reaching the subbasin. Management of sport and treaty fisheries in the Klickitat subbasin is substantially the same as that described earlier for other species. Escapement of coho is not currently a constraint in Klickitat River harvest management as brood stock is generally obtained from lower river hatchery facilities.

6.3 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

- Natural spawners will be integrated into the broodstock to represent the natural coho run throughout the season.
- Hatchery program fish are mass-marked.

- There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the sub-basin.
- Holding pond procedures follow IHOT guidelines.
- Other listed fish encountered during the broodstock collection process will be returned directly to the river or passed into the upper watershed, with minimal handling and holding time.
- Any observed mortalities will be reported in the WDFW Hatcheries Headquarters Database.

7 SECTION 7. BROODSTOCK COLLECTION

7.1 Life-history stage to be collected (adults, eggs, or juveniles).

Adults returning to the Washougal River.

7.2 Collection or sampling design.

The adult collection occurs at the Washougal Hatchery fishway trap from October through December, with most of the collection of coho in November/December. The rack at the fishway is installed in August and is removed in February. Egg-take is spread out over a three week period during the peak of the run. Because the on-station release is an integrated program, 30% of the broodstock will come from natural-origin spawners. Natural-origin spawners in excess of collection goals will be passed upstream.

Lethal removal of known hatchery fish (identified by a fin-mark) will be utilized as a tool to promote recovery of natural-origin stocks and meet management guidelines and objectives. The proportion of hatchery fish removed will vary to meet management goals and objectives in the basin and, in some cases, may be used to evaluate Hatchery Reform actions; currently, all hatchery coho beyond broodstock needs are removed from the system.

WDFW has operated a resistance board weir (RBW) located on the mainstem Washougal at RKm 22.0 (RM 13.7) since 2011. A river-spanning weir provides the ability to capture a high rate of returning adult salmonids. The trap is operated in the river from August 1 through October 31, however, it is not used to collect broodstock for the coho program. All coho and steelhead captured are passed above the trap.

7.3 Identity.

The target population is the Washougal River Type-N coho stock. This population is 100% mass-marked to differentiate them from natural-origin fish; a portion are also coded-wire tagged (CWT).

7.4 Proposed number to be collected:

7.4.1 Program goal (assuming 1:1 sex ratio for adults):

See HGMP section 6.2.2.

7.4.2 Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

Table 7.4.2.1: Total broodstock collection levels for total on-station and off-station programs combined.

Brood Year	Females	Males	Jacks
2002	1,308	1,303	4
2003	1,166	1,151	16
2004	1,154	1,148	9

2005	1,151	1,190	1
2006	1,165	1,161	4
2007	1,068	1,062	1
2008	770	774	16
2009	915	915	0
2010	1,009	1,009	16
2011[a]	575	557	18
2012	580	573	15
2013	887	909	41

Source: WDFW Hatcheries Headquarters Database 2014.

[a] Returns in brood year 2011 were insufficient for broodstock needs. Shortfall was backfilled with eggs from Lewis River Type-N coho.

[a] Returns in brood year 2012 were insufficient for broodstock needs. Shortfall was backfilled with eggs from Lewis River Type-N coho.

7.4.2.2: Unmarked broodstock collection for on-station integrated program.

Brood Year	Unmarked		
	Females	Males	Jacks
2010	58	58	0
2011	15	30	0
2012	5	8	0
2013	35	56	0

Source: WDFW Hatcheries Headquarters Database 2014.

7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.

Surplus hatchery fish can be donated to food banks or used for nutrient enhancement.

Table 7.5.1: Disposition of Total Type-N coho returning to the Washougal River (RBW and Washougal Hatchery combined).

Brood Year	Spawned	Mortality	Surplus	Released Upstream
2002	2,628	199	15,110	1,435
2003	2,343	299	2,826	344
2004	2,321	494	1,407	82
2005	2,343	215	911	31
2006	2,330	1,959	6,471	325
2007	2,141	266	2,955	n/a
2008	1,564	1,361	3,201	108
2009	1,750	906	9,563	0
2010	1,092	115	506	0
2011	1,091	58	401	0
2012	1,140	74	69	0

Source: WDFW Hatcheries Headquarters Database 2014, hatchery data.

7.6 Fish transportation and holding methods.

Adults are not transported for this program.

7.7 Describe fish health maintenance and sanitation procedures applied.

WDFW facilities follow Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection Committee (PNFHPC), WDFW's Fish Health Manual (November 1966, updated March 1998, revised March 2010) or tribal guidelines. Fish Health Specialists make monthly visits and consult with staff. The adult holding area is separated from all other hatchery operations. Disinfection procedures that prevent pathogen transmission between stocks of fish are implemented during spawning: all equipment and personnel use disinfection procedures (chlorine or iodophor) upon entering or exiting the area. The spawning area and spawning implements are disinfected at the end the spawning day.

Fish treatments are rare and only for fungus control requiring formalin bath treatments.

7.8 Disposition of carcasses.

Carcasses can be used for nutrient enhancement, donated to food banks or disposed of at a landfill.

7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

Hatchery weir:

- Limit out-of-basin transfers of eggs or fish, except in extreme cases.
- Broodstock will be collected throughout the entire run time from adults arriving at the rack.
- Broodstock collection and sorting procedures can quickly identify non-target listed fish if encountered.
- Returning adult coho have been mass-marked at Washougal Hatchery since 1998.
- There are no known genotypic, phenotypic, or behavioral differences between either the hatchery stock or natural stock in the subbasin.
- Holding pond procedures follow IHOT guidelines.
- Other listed fish will be released immediately, if encountered, during the broodstock collection process.

8 SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1 Selection method.

Cohorts are utilized from the entire run cycle with males and females available on a given day mated randomly. Spawning is conducted weekly and occurs over a period of four to five weeks, with the peak in November.

8.2 Males.

Adults are spawned at a 1:1 male:female ratio. Jacks are incorporated into the spawning at a minimum of 5.0% of the total spawning population.

8.3 Fertilization.

Fertilization occurs in 1:1 female-to-male ratio. Ovarian fluid is not drained prior to fertilization. Water hardening procedures with iodophor are followed after twenty minutes. Iodophor solution is used as rinse that is applied to hands and spawning implements per spawning. Iodophor foot baths are located at entrance to incubation room. Generally, sixty ovarian fluid and kidney/spleen

samples are collected from female spawners to test for the presence of viral pathogens. Unmarked fish not used for integration needs may be released upstream of the hatchery.

8.4 Cryopreserved gametes.

Cryopreserved gametes are not used.

8.5 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

- Limit/eliminate out-of-basin transfers.
- Protocols for population size, fish health disinfection and genetic guidelines are followed.
- Spawn all collected mature broodstock if possible without regard to age, size, color or other physical characteristics. If not spawning all collected mature adults over the season, apply the same rationale to individual spawn days.
- Randomize mating and avoid selectivity beyond ripeness on a given spawn day.
- Use one male to one female as much as possible in order to ensure an equal genetic contribution.
- Do not mix milt from multiple males and add to eggs (pooling prior to mixing) in order to eliminate disproportionate genetic male contributions.
- Do not re-use males except as part of specific spawning protocols. A given male should be used as the first mate for only one female total.

9 SECTION 9. INCUBATION AND REARING -Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1 Incubation:

9.1.1 Number of eggs taken and survival rates to eye-up and/or ponding.

Brood Year	Total Program Egg-Take
2002	4,859,000
2003	3,730,000
2004	3,500,000
2005	3,978,900
2006	4,086,000
2007	3,665,069
2008	3,142,000
2009	3,280,300
2010	3,372,500
2011[a]	2,280,392
2012	1,876,793
2013	3,220,161

Source: WDFW Hatcheries Headquarters Database 2014.

Table 9.1.1.1: Survival rates (%) from egg-take to ponding, Washougal Type-N coho.

Brood Year	% Survival Rate (Segregated)		% Survival Rate (integrated)	
	Green-to-Eyed	Eyed-to-Ponding	Green-to-Eyed	Eyed-to-Ponding

2002	94.2	97.2	n/a	n/a
2003	93.9	96.4	n/a	n/a
2004	95.4	96.3	n/a	n/a
2005	93.7	97.2	n/a	n/a
2006	95.9	93.5	n/a	n/a
2007	86.6	99.0	n/a	n/a
2008	92.8	98.0	n/a	n/a
2009	92.4	98.0	n/a	n/a
2010	92.1	98.0	n/a	n/a
2011	95.4	96.4	91.1	98.0
2012	92.7	93.4[b]	94.4	95.2

Source: WDFW hatchery records 2014.

n/a – Not available

[a] BY 2011 does not include 940,000 eggs received from Lewis River Hatchery to backfill the egg-take shortfall.

[b] BY 2012 does not include the 1.2-million eyed-eggs received from Lewis River Hatchery to backfill the egg-take shortfall.

9.1.2 Cause for, and disposition of surplus egg takes.

The program broodstock collection goals set in the annual Future Brood Document. Egg-takes are managed according to data/information of historical egg-takes at the facility, and are maintained within the ±5% guideline of the permit. Viral sampling (60 fish lots) are conducted over the course of the season.

In the event that egg survival is higher than expected, WDFW Regional Managers will be contacted for instructions for disposition of the surplus in accordance with Regional policy and guidelines set forth in management plans/agreements and ESA permits.

9.1.3 Loading densities applied during incubation.

Eggs are placed in deep troughs at 110,000 eggs/unit until eyed, then moved to stack incubators for hatching at 10,000 eggs/tray. Removal of dead eggs, accurate enumeration and loadings are adjusted during this time. Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations are followed for water quality, flows, temperature, substrate, and incubator capacities.

9.1.4 Incubation conditions.

IHOT species-specific incubation recommendations are followed for water quality, flows, temperature, substrate and incubator capacities. Incubation water temperature is monitored by thermograph and recorded (see **Table**), and temperature units (TU) are tracked for embryonic development. Harmful silt and sediment is cleaned from incubation systems regularly while eggs are monitored to determine fertilization and mortality.

Eyed-eggs are treated with iodophor and formalin until eggs are ready to be shocked and picked. Eyed-eggs are loaded into the stack incubators, at 10,000 egg/tray, and incubated on surface water, at a flow of 5 gpm. All eggs were treated with formalin dripped at 1:600 to control *Saprolegnia* until hatched. Dissolved oxygen (DO) content is monitored and have been at acceptable levels of saturation with a minimum criteria of 8 to 10 ppm. Siltation is controlled with rodding, as needed. Vexar® is used as a artificial substrate.

9.1.5 Ponding.

Initial feeding and early-rearing occurs in the incubation troughs. Ponding/feeding begins on a volitional basis when the fry are 100% at the swim-up stage. At this point very little, if any, yolk

sack will be present. Fry are typically ponded to the raceways starting in early-February, when the yolk slit is closed to approximately 1-mm wide (approximately 1,600 TUs) or KD factor (95% yolk absorption). Fry are poured into 30-gallon plastic containers (or transferred via irrigation lines) and ponded to the appropriate raceway (see HGMP section 5.5 for raceway specifications).

9.1.6 Fish health maintenance and monitoring.

Staff conducts daily inspection, visual monitoring and sampling from eye, fry fingerling and sub-yearling stages. As soon as potential problems are seen, these concerns are immediately communicated to the WDFW fish health specialist. In addition, fish health specialists conduct inspections monthly. Potential problems are managed promptly to limit mortality and reduce possible disease transmission. Disease treatment varies with the pathogen encountered, but is generally antibiotic in nature for bacterial infections and bath or drip treatments with chemotheraputants for external infections.

See also **Attachment 1** for health monitoring information.

9.1.7 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

- Limit/eliminate out-of-basin transfers.
- IHOT and WDFW fish health guidelines followed.
- Multiple units are used in incubators.
- Splash curtains can isolate incubators.
- Temperature, dissolved oxygen, and flow are monitored.
- Dead eggs are discarded in a manner that prevents disease transmission.

9.2 Rearing:

9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available.

Table 9.2.1.1: Survival rates (%) from ponding to release.

Brood Year	Segregated Program		Integrated Progam	
	Ponding-to-Sub-yearling	Sub-yearling-to Release	Ponding-to-Sub-yearling	Sub-yearling-to Release
2002	95.0	93.2	n/a	n/a
2003	96.2	91.5	n/a	n/a
2004	94.7	96.8	n/a	n/a
2005	98.0	95.4	n/a	n/a
2006	93.0	91.6	n/a	n/a
2007	91.4	99.0	n/a	n/a
2008	94.1	97.4	n/a	n/a
2009	99.9	85.9	n/a	n/a
2010	92.0	91.0	n/a	n/a
2011	99.0	88.3	98.2	92.9
2012	97.0	97.9	92.7	99.3

Source: WDFW hatchery records.
n/a – Not available

9.2.2 Density and loading criteria (goals and actual levels).

Loading and density levels at WDFW hatcheries conform to standards and guidelines set forth in *Fish Hatchery Management* (Piper et. al. 1982), the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006). IHOT standards are followed for water quality, alarm systems, predator control measures to provide the necessary security for the cultured stock, loading and density.

Densities are kept at or below 3.3 lbs /gpm and 0.5 lbs /cu ft. before the last loading reduction in the fall of the year. Trough maximum loading is 40 lbs at 12 gpm (3.33 lbs/gpm). Tank and raceway maximum loading for early rearing is 132 lbs for the tanks at 40 gpm (3.3 lbs/gpm) and 800 lbs per raceway at 300 gpm.(2.66 lbs/gpm). The final loading per raceway is approximately 3,200 lbs. at 300 gpm (10.6 lbs/gpm).

9.2.3 Fish rearing conditions

Table 9.2.3.1: Monthly average surface water temperature (°F), Washougal River.

Month	Average Water Temperature (ºF)		
	Washougal R.	Bob Creek	Boyle Creek
January	39.3	43.2	42.2
February	42.1	44.5	44.3
March	43.4	45.0	46.0
April	45.6	47.1	47.2
May	50.6	49.1	50.8
June	54.1	50.5	51.2
July	61.4	56.9	59.1
August	60.8	58.2	58.7
September	56.8	56.0	56.1
October	47.5	48.0	48.5
November	44.1	45.0	45.2
December	38.7	43.2	42.3
Average	**48.7**	**48.9**	**49.3**

Source: WDFW Hatchery Records 2014.

IHOT standards are followed for water quality, alarm systems, predator control measures (netting), loading and density.

Fish are reared in on a combination of river and spring water. Temperature, dissolved oxygen and pond turnover rate are monitored. IHOT standards are followed for: water quality, alarm systems, and predator control measures (netting) to provide the necessary security for the cultured stock. Settleable solids, unused feed and feces are removed regularly to ensure proper cleanliness of rearing containers.

A portion of the fish may be mass-marked in June, when they are about 160 fpp, depending on growth rates and water temperature; the remainder are marked in October, at around 50 fpp, when water temperatures are cooler. After marking, on-station program coho are reared in two raceways, where they remain until release in May; Klickitat program coho are transferred to the concrete rearing pond (Pond 27) before transfer in late-March/April.

9.2.4 Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Table 9.2.4.1: Monthly fish growth information by length (mm), weight (fpp), condition factor and growth rate.

Rearing Period	Length (mm)	Weight (fpp)	Condition Factor	Growth Rate
March	34.3	1,244	2.924	n/a
April	41.0	727	n/a	n/a
May	52.2	353	n/a	n/a
June	61.0	220	n/a	n/a
July	67.2	165	3.896	n/a
August	73.9	124	n/a	n/a
September	83.9	84.6	n/a	n/a
October	98.3	52.6	4.559	n/a
November	106	42.0	n/a	n/a
December	110	37.5	n/a	n/a
January	113	34.5	n/a	n/a
February	120	28.9	n/a	n/a

Source: WDFW Hatchery Records.

9.2.5 Indicate monthly fish growth rate and energy reserve data (average program performance), if available.

See HGMP section 9.2.4. Initial feeding and early-rearing occurs in the incubation troughs. Ponding/feeding begins on a volitional basis when the fry are 100% at the swim-up stage. No energy reserve data available.

9.2.6 Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Fish are given variety of diet formulations including starter and fry feed; the food brand used may vary, depending on cost and vendor contracts. Feeding frequencies varies depending on the fish size and water temperature, and usually begin at 8 feedings/7 days a week to 2 feedings/7 days a week; frequency of feeding decreases as fish grow from fry (hourly) to smolt (once or twice daily). Feed rates range from 0.05 to 3.0% B.W./day. The overall season feed conversion ratio has averaged approximately 1:1.

9.2.7 Fish health monitoring, disease treatment, and sanitation procedures.

Monitoring. Policy guidance includes: *Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Health Policy Chapter 5, IHOT 1995). A fish health specialist inspects fish monthly and checks both healthy and presence of symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Kidney and spleen are checked for BKD. Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted (see **Attachment 1** for Virology Sampling reports, and **Attachment 2** - Fish Health Monitoring history).

Disease Treatment. As needed, appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. Mortality is collected and disposed of at a landfill. Fish health and/or treatment reports are kept on file (see also **Attachment 2**: Fish Health Monitoring summaries).

Sanitation. All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy). Every effort is made to prevent the horizontal spread of pathogens by splashing water. All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots. Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. Footbaths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens. Mortalities are collected and disposed of at a landfill. Fish Health and/or treatment reports are kept on file (see **Attachment 1** for Fish Health monitoring history).

9.2.8 Smolt development indices (e.g. gill ATPase activity), if applicable.

Gill ATPase activity is not measured. Fish size at release time is critical to the readiness for migration. The migratory state of the release population is determined by fish behavior. Aggressive screen and intake crowding, swarming against sloped pond sides, a leaner (0.80 – 0.90) condition factor (K), a silvery physical appearance and loose scales during feeding events are signs of smolt development.

9.2.9 Indicate the use of "natural" rearing methods as applied in the program.

Not applicable.

9.2.10 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

See HGMP sections 5.8, 6.3, 7.9 and 9.1.7.

10 SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10.1 Proposed fish release levels.

Table 10.1.1: Proposed release levels (maximum number).

Age Class	Max. Number	Size (fpp)	Release Date	Location	Eco-Province
Yearling	150,000	15.0	June	Washougal River	Lower Columbia
	2,500,000	20.0	April	Klickitat River	Columbia Gorge

Source: WDFW Future Brood Document 2014.
Note: 15 fpp = 146 mm fork length (fl); 20 fpp = 133 mm fl.

10.2 Specific location(s) of proposed release(s).

Stream, river, or watercourse:	Washougal R. (WRIA 28.0159)	Klickitat R. (WRIA 30.0002)
Release point:	RKm 32.2	RKm 18
Major watershed:	Washougal Sub-Basin	Klickitat Sub-Basin
Basin or Region:	Lower Columbia River	Middle Columbia River

10.3 Actual numbers and sizes of fish released by age class through the program.

Table 10.3.1: Number of yearlings released, size, CVs and release date, by age and year.

Release Year	Washougal River				Klickitat River			
	Number	Avg Size (fpp)	CV	Date	Number	Avg Size (fpp)	CV	Date
2002	539,620	16.9	5.86	April 25	2,453,166	19.4	6.54	March 4-27
2003	508,650	16.8	5.00	May 1	2,554,300	20.0	5.45	March 9-31
2004	508,050	19.0	6.24	April 3-5	2,468,638	20.1	7.40	March 6-29
2005	20,000	22.0	10.10	March 25	2,499,530	22.0	10.10	March 21-25
	514,940	16.7	6.43	May 2				
2006	498,540	17.0	7.38	April 13-24	2,424,276	21.6	9.40	March 20-29
2007	500,180	16.2	5.84	April 11	2,403,690	18.7	7.70	April 2-6
2008	498,235	15.8	6.17	May 1	2,625,000	20.5	8.20	April 1-4
2009	237,000	19.5	6.34	May 1	2,503,299	21.0	7.77	April 1-2
2010	159,277	16.0	6.22	May 1	1,844,175	20.0	7.60	April 1-5
2011	151,550	18.4	6.30	May 2	2,501,000	22.0	6.94	April 1-5
2012	152,039	17.2	4.70	May 1	2,605,701	20.5	6.85	April 2-6
2013	153,227	15.1	5.00	May 1	2,494,340	20.0	8.60	March 25-29

Source: WDFW Headquarters Hatcheries Database 2014.
Note: 15 fpp = 146 mm fork length (fl); 17 fpp = 140 mm fl; 18.5 fpp =-136 mm; 20 fpp = 133 mm fl; 22 fpp = 128 mm.

10.4 Actual dates of release and description of release protocols.

Washougal Hatchery releases. Smolts are force released from the raceways to the Washougal River in May (see **Table 10.3.1** for actual release dates).

Klickitat River releases. Smolts are trucked from Washougal Hatchery to the release site in the lower Klickitat River at RKm 18, and force-released in April (see **Table** for actual release dates.

10.5 Fish transportation procedures, if applicable.

Washougal Hatchery. Program fish are released on-station and are not transported.

Klickitat River. Fish are transported by truck for direct release into the Klickitat River at RKm 18. Average transport time is around 1 hour and 40 minutes.

10.6 Acclimation procedures (methods applied and length of time).

Washougal Hatchery. Fish are reared, acclimated, and released as yearlings directly into the Washougal River from the raceways at the Washougal Hatchery. All production occurs with a mixture of Boyles Creek, Bob Creek, and Washougal River water, giving program fish a distinct location indicator.

Klickitat River. This is a direct plant into the Klickitat River.

10.7 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

Table 10.7.1: Marks applied, by brood year, age class and mark-type.

Brood Year	Age Class	Release Site	Number	Mark-Type
2014	Yearlings	Washougal Hatchery	30,000	AD+CWT
			120,000	AD-only
		Klickitat River	60,000	AD+CWT
			2,440,000	AD-only

Source: WDFW Future Brood Document 2014.

Fish have been 100% mass-marked (adipose fin-clipped) since the 1995. In addition, a total of 90,000 smolts are released AD + coded-wire tag (AD+CWT) at each site to help determine origin and straying rates. Fish are mass-marked over six weeks starting in October (about 180 fpp), depending on growth rates and water temperature.

Scale samples for natural origin fish are read at WDFW Headquarters Olympia to verify hatchery- or natural-origin. Snouts collected from the adipose fin-clipped adults are dissected, recovered and read at the WDFW CWT Lab in Olympia. CWT data is reported annual to RMIS.

10.8 Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

The program guidelines for annual broodstock/egg-take collection are managed to prevent any surpluses, and maintained within the ±5% guideline. In the event of surplus >10%, WDFW Regional Managers will in accordance with regional policy and guidelines set forth in management plans/agreements and ESA permits, and after consultation with NMFS, instruct hatchery staff for disposition of the surplus.

10.9 Fish health certification procedures applied pre-release.

All fish are examined for the presence of "reportable pathogens" as defined in the P*acific Northwest Fish Health Protection Committee* (PNFHPC) disease control guidelines, within three weeks prior to release. Fish transfers into the sub-basin are inspected and accompanied by notifications as described in IHOT and PNFHPC guidelines.

Prior to release, the population health and condition is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release and up to six weeks on systems with pathogen-free water and little or no history of disease. Prior to this examination, whenever abnormal behavior or mortality is observed, staff also contacts the Area Fish Health Specialist. The fish specialist examines affected fish, and recommends the appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the *Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State* (WDFW and WWTIT 1998, updated 2006) and IHOT guidelines.

10.10 Emergency release procedures in response to flooding or water system failure.

Emergency procedures and disposition of fish would adhere to the protocols and procedures set forth in the Permit. If the program were threatened by ecological or mechanical events, the Complex Manager would contact and inform Regional management of the situation. Based on a determination of a partial or complete emergency release of program fish, authorized personnel would pull screens and sumps and fish would be early-released into the Washougal River. No release of fish will occur without a review by WDFW Fish Management and a risk assessment is performed.

In the event of a water system failure, screens would be pulled to allow fish to exit the ponds or in some cases they can be transferred into other rearing vessels to prevent an emergency release. WDFW also has emergency response procedures for providing back-up pumps, transport trucks, etc. in cases of emergency. In cases of severe flooding the screens are not pulled because flood waters rise to the point where they breach the ponds. Past experience has shown that the fish tend to lay on the bottom of the pond during flooding events and only those that are inadvertently swept out are able to leave. Every effort will be made to avoid pre-programmed releases including transfer to alternate facilities. Emergency releases, if necessary and authorized, would be managed by removal of outlet screens and pull sumps of the rearing units. If possible, staff would set up portable pumps to use river water to flush the fish.

10.11 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

- All program fish are mass marked for easy identification. Returning hatchery fish are under heavy selective harvest and are identified by an adipose fin-clip.
- The production and release of only smolts through fish culture and release practices fosters rapid seaward migration with minimal delay in the rivers, limiting interactions with naturally-produced steelhead juveniles.
- WDFW fish health and operational concerns are communicated to WDFW Region 5 staff for any risk management or needed treatment. See also HGMP section 9.7.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migration performance behavior, and intra and interspecific interactions with wild fish to access, and adjust if necessary, hatchery production and release strategies to minimize effects on wild fish.

11 SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1 Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

11.1.1 Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

See also Klickitat Complex Coho HGMP.

Resistance Board Weir. A river-spanning resistance board weir (RBW) and trap box will be installed in the lower Washougal River RKm 22.0 (RM 13.7) between August 1 and October 31 to facilitate collection/ management/monitoring of returning adult salmonids. Operations will primarily be focused on broodstock collection for fall Chinook programs, but will also be used to assess abundance monitoring and management. In addition, information gathered from other returning salmonids (chum, coho, and steelhead) will also be used to improve monitoring and management when possible. All fish (salmonids and other resident fish) will be released unharmed, except for a portion of hatchery-origin and natural-original fall Chinook needed for broodstock purposes, and surplus hatchery-origin fish beyond escapement needs.

The weir provides the ability to capture returning adult salmonids at a high rate. When the weir is "fish tight" (all fish are captured), direct census counts of a population are possible, all fish can be sampled (if necessary) and the ability to selectively remove and/or pass 100% of fish is provided. In instances when the weir is not fish tight, captured fish can be sampled, selectively sorted, and marked. All fall Chinook passed upstream at the weir will be given two uniquely-numbered Floy-tags (2-inch plastic tube tags with T-bar anchor, attached with a tagging gun/needle by inserting slightly behind the dorsal fin, anchored between internal dorsal rays), opercula-punched, and biological data (fork length and sex) recorded. Coho, steelhead, and any other salmonids will be enumerated by mark category and sex, and will not be tagged or marked at the weir prior to being released upstream.

The weir will also be used to meet guidelines/objectives for control of hatchery-origin fish allowed to spawn naturally. The congressionally-established Hatchery Scientific Review Group (HSRG) has reviewed Lower Columbia River (LCR) hatcheries and developed hatchery reform principles and standards that promote change towards conservation goals while still maintaining sustainable fisheries (HSRG 2009a, http://hatcheryreform.us). The HSRG developed standards for hatchery programs appropriate to the affected natural population's status as primary, contributing or stabilizing (HSRG 2009a). One of these standards pertains to the proportion of

natural origin spawners composed of hatchery origin fish (pHOS). Weirs are one tool being used by WDFW to manage pHOS.

See also HGMP section sections 2.23, 5.1 and 7.2.

Mass-marking. Performance indicators for harvest will be accomplished by continuing mass marking (ad clip). CWT recoveries will help determine stray rate contributions on spawning grounds by watersheds close in proximity to this program's release vicinity. See HGMP section 1.10 Monitoring and Evaluation for additional plans and methods to collect data necessary.

Additional research, monitoring and evaluation in the Lower Columbia. WDFW is currently conducting the following Mitchell Act-funded research, monitoring and evaluation projects:

Table 11.1.1.1: Current WDFW Mitchell Act-funded research, monitoring and evaluation projects.

Project	Description
LCR Monitoring	WDFW has implemented an expanded monitoring program for Chinook, coho, chum and steelhead populations in the Lower Columbia River (LCR) region of Southwest Washington (WDFW's Region 5) and fishery monitoring in the lower mainstem of the Columbia River. The focus of this expanded monitoring is to 1) gather data on Viable Salmonid Population (VSP) parameters – spawner abundance, including proportion of hatchery-origin spawners (pHOS), spatial distribution, diversity, and productivity, 2) to increase the coded wire tag (CWT) recovery rate from spawning grounds to meet regional standards, and 3) to evaluate the use of PIT tags to develop harvest rates for salmon and steelhead populations. Additionally, key watersheds are monitored for juvenile salmonid out-migrant abundance. Coupled with adult abundance information, these data sets allow for evaluation of freshwater productivity and development of biological reference points, such as seeding capacity. Monitoring protocols and analysis methods utilized are intended to produce unbiased estimates with measurements of precision in an effort to meet NOAA monitoring guidelines (Crawford and Rumsey 2009).

11.1.2 Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

Except for a risk involving genetic introgression, all other aspects of the M&E outlined in HGMP section 1.10 are currently funded (see also HGMP section 11.1.1).

11.2 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Monitoring, evaluation and research follow scientific protocols with adaptive management process if needed. WDFW will take risk aversion measures to eliminate or reduce ecological effects, injury, or mortality as a result of monitoring activities See HGMP section 1.10 Monitoring and Evaluation for additional plans and methods to collect data necessary, In

addition, we will adaptively manage all aspects of the program to continue to minimize associated risks using the more recent available scientific research.

Trap box conditions. The highest potential for injury or mortality will likely be due to overloading of the trap box, which could be exacerbated by low flow/warm water conditions. To minimize this, the trap will be staffed nearly continuously while installed and the trap box will be checked multiple times/day, as necessary; temporary holding time will be <24 hours. In addition, water temperature will be monitored. If abundance of salmonids exceeds the ability of staff to efficiently work through fish, modifications to the sampling schedule and/or trapping protocols will be made to facilitate passage without handling. At all locations, this can be accomplished by opening the upstream gate on the trap box and allowing fish to pass through without handling, or by removing (or submerging) a panel section of the weir to allow fish passage around the trap box.

High flow events could prevent access to the trap box and limit WDFW staff's ability to handle fish, potentially trapping fish for the duration of the high flow event. WDFW project staff will monitor stream gauges to gather near real-time information on streamflows throughout the Lower Columbia. Gauges are operated by Washington Department of Ecology (DOE) on the Washougal River (station ID: 28B080). Utilizing streamflow, weather forecast information, and direct observation, WDFW personnel will determine when flows begin to limit the ability to access the trap box and sample fish. If these conditions are encountered the trap box will either be 1) opened on both the upstream and downstream end to allow direct passage through the trap, or 2) closed on both the upstream and downstream ends to prevent fish from becoming entrapped while personnel cannot access the trap. Which option is chosen will depend on the extent of the high flow event, expected duration, and the trap counts (i.e. relative abundance of fish that may be impeded) in the weekly trapping period prior to the event.

Fish handling and tagging. Handling and tagging of fish presents another potential injury/mortality risk. To minimize this, experienced, senior level staff will be overseeing handling and operations and ensuring field technicians are well trained in proper fish handling techniques. In addition, anesthetic is used to calm fish during intrusive tagging procedures.

Impeding fish movement. Close attention will be paid to the recruitment of fish into the adult trap and the accumulation of fish below the trap. If fish are not adequately moving into the trap, modifications will first be made to adjust flow and try to increase trapping efficiency. If this does not encourage fish to move into the live box, a beach seine will be used to either capture fish or crowd them into the live box. The final option if fish are stacking up below the weir and cannot be captured through trapping or seining, will be to remove or submerge weir panels to allow fish passage upstream of the weir for short intervals.

Spawning ground surveys and biological sampling occurring during the recovery will employ measures to ensure that effects on the survival of the listed Chinook salmon population are insignificant. Salmon redds and live spawning fish will not be disturbed during surveys and sampling.

12 SECTION 12. RESEARCH

12.1 Objective or purpose.

No research is directly associated with the program.

12.2 Cooperating and funding agencies.

Any research is conducted by WDFW.

12.3 Principle investigator or project supervisor and staff.

Not applicable.

12.4 Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

Not applicable.

12.5 Techniques: include capture methods, drugs, samples collected, tags applied.

Not applicable.

12.6 Dates or time period in which research activity occurs.

Not applicable.

12.7 Care and maintenance of live fish or eggs, holding duration, transport methods.

Not applicable.

12.8 Expected type and effects of take and potential for injury or mortality.

Not applicable.

12.9 Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

Not applicable.

12.10 Alternative methods to achieve project objectives.

Not applicable.

12.11 List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

Not applicable.

12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.

Not applicable.

13 SECTION 13. ATTACHMENTS AND CITATIONS

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Attachment 1: WDFW Virology Sampling 2006-2007 through 2013-2013: Washougal Hatchery.

Source: WDFW Fish Health Lab data 2014 (John Kerwin)

Hatchery/ Collection site	Stock	Species	Date Sampled	Results	Comments	Life Stage	Sample number	NUMBER OF SAMPLES						CELL LINE	ID	INOC DATE
								OF	POOL	K/S	POOL	fry/visc /other	pools			
WASHOUGAL	WASHOUGAL R	FCHIN	10/10/06	**PARAMYXOVIRUS**	1+/12p OF & K/S	AD	1011-7/8	60	12	60	12			C	F&P	
WASHOUGAL	WASHOUGAL R	NCOHO	12/05/06	NEV		AD	1206-1/2	60	12	60	12					
WASHOUGAL	WASHOUGAL R	FCHIN	10/16/07	NEV		AD	1017-1/2	60	12	60	12					
WASHOUGAL	WASHOUGAL R	NCOHO	12/18/07	NEV	eggs to be shipped to Prosser H	AD	1219-4/5	84	20	60	13					
WASHOUGAL	WASHOUGAL R	FCHIN	10/07/08	NEV		AD	1008-5/6	60	12	60	12					
WASHOUGAL	WASHOUGAL R	NCOHO	12/16/08	NEV		AD	1217-7/8	60	12	60	12					
WASHOUGAL	WASHOUGAL R	FCHIN	10/13/09	NEV		AD	1014-1/2	30	6	60	12					
WASHOUGAL	WASHOUGAL R	FCHIN	10/13/09	NEV		AD	1014-1/2	30	6	60	12					
WASHOUGAL	WASHOUGAL R	FCHIN	10/27/09	NEV		AD	1028-8/9	30	6	30	6					
WASHOUGAL	WASHOUGAL R	FCHIN	10/27/09	NEV		AD	1028-8/9	30	6	30	6					
WASHOUGAL	WASHOUGAL R	NCOHO	12/15/09	NEV		AD	1215-19/20	60	12	60	12					
WASHOUGAL	WASHOUGAL R	NCOHO	12/15/09	NEV		AD	1215-19/20	60	12	60	12					
WASHOUGAL	WASHOUGAL R	FCHIN	10/19/10	NEV		AD	1020-6/7	60	12	60	12					
WASHOUGAL	WASHOUGAL R	NCOHO	12/07/10	NEV		AD	1207-3/4	60	12	60	12					
WASHOUGAL	WASHOUGAL R	FCHIN	10/18/11	NEV		AD	1019-3/4	60	12	60	12					
WASHOUGAL	DUNCAN CR	CHUM	11/16/11	NEV		AD	1117-5/6	5	2	13	11					
WASHOUGAL	DUNCAN AND IVE'S CR	CHUM	11/30/11	NEV	OF: #12-14, 15-17, 18, 20-22, 23-25, 26-28; K/S: F #12-15, 16-19, 20-23, 24-28 & M #13-17, 18-22, 23-26	AD	1201-3/4	16	6	31	7					
WASHOUGAL	COLUMBIA R/ VANCOUVER	CHUM	12/02/11	NEV	frozen; OF's:F11-13,F14-16,F17-19,F20-21 & K/S's: F/M 11-15,16-20, 21-22	AD	1208-6/7	11	4	24	6					
WASHOUGAL	IVE'S CR	CHUM	12/07/11	NEV	OF: #29-31, 32&34 K/S: F#29-33, M#27-32	AD	1208-8/9	5	2	11	2					
WASHOUGAL	COLUMBIA R/ VANCOUVER	CHUM	12/08/11	NEV	OF: F#23-28, 29-34; K/S: F#23-27, 28-32, 33-34, M#23-27, 28-32, SAMPLES CAME IN FROZEN	AD	1214-9/10	12	2	22	5					
WASHOUGAL	COLUMBIA R/ VANCOUVER	CHUM	12/13/11	NEV	OF: F#35-40, 41-46, 47-49; K/S: F#35-39, 40-44, 45-48, M#33-37, 38-42, 43-46	AD	1215-5/6	15	3	29	6					
WASHOUGAL	WASHOUGAL R	NCOHO	12/14/11	NEV		AD	1215-8/9	60	12	60	12					
WASHOUGAL	COLUMBIA R/ VANCOUVER	CHUM	12/16/11	NEV	I-205 collection site, OF and K/S came in frozen, OF:F#50-54, 55-57; K/S; F350-54, 55-57, M#47-51, 52-59	AD	1221-9/10	8	2	16	4					
WASHOUGAL	WASHOUGAL R	FCHIN	10/16/12	NEV		AD	1017-1/2	60	12	60	12					10/17
WASHOUGAL	DUNCAN CR	CHUM	11/14/12	NEV	Sent frozen	AD	1127-7/8	5	1	10	2					11/28
WASHOUGAL	DUNCAN CR	CHUM	11/07/12	NEV	Sent frozen	AD	1127-9/10	1	1	4	2					11/28
WASHOUGAL	COLUMBIA R/ VANCOUVER	CHUM	11/21/12	NEV	Sent frozen, I-205 collection site	AD	1127-11/12	10	2	20	4					11/28
WASHOUGAL	IVE'S CR	CHUM	11/7,11/14	NEV	Sent frozen	AD	1127-13/14	6	2	14	4					11/28
WASHOUGAL	DUNCAN CR	CHUM	11/28/12	NEV		AD	1129-4/5	11	2	22	4					11/30
WASHOUGAL	WASHOUGAL R	NCOHO	12/04/12	NEV		AD	1205-1/2	60	12	60	12					12/05
WASHOUGAL	I-205, WASHOUGAL R	CHUM	11/30/12	NEV	Samples previously frozen	AD	1212-5/6	14	3	28	6					12/12
WASHOUGAL	I-205, WASHOUGAL R	CHUM	12/07/12	NEV	Samples previously frozen	AD	1212-7/8	17	4	33	8					12/12
WASHOUGAL	I-205, WASHOUGAL R	CHUM	12/11/12	NEV		AD	1212-9/10	3	1	7	2					12/12

Hatchery/ Collection site	Stock	Species	Date Sampled	Results	Comments	Life Stage	Sample number	NUMBER OF SAMPLES						CELL LINE	ID	INOC DATE
								OF	**POOL**	**K/S**	**POOL**	**fry/visc /other**	**pools**			
WASHOUGAL	WASHOUGAL R	FCHIN	10/15/13	NEV		AD	1016-1/2	60	12	60	12					10/16/13
WASHOUGAL	DUNCAN CR	CHUM	11/15/13	NEV		AD	1121-1/2	3	1	6	2					11/21/13
WASHOUGAL	DUNCAN CR	CHUM	11/20/13	**Virus +**	1121-4; 1+/2PLS	AD	1121-3/4	5	1	10	2					11/21/13
WASHOUGAL	I-205	CHUM	11/22/13	NEV		AD	1206-7/8	8	2	16	4					12/06/13
WASHOUGAL	I-205	CHUM	11/27/13	NEV		AD	1206-1/2	6	2	12	4					12/06/13
WASHOUGAL	DUNCAN CR	CHUM	11/27/13	NEV		AD	1206-3/4	6	2	12	4					12/06/13
WASHOUGAL	WASHOUGAL R	NCOHO	12/03/13	NEV		AD	1204-4/5	60	12	60	12					12/04/13
WASHOUGAL	DUNCAN CR	CHUM	12/04/13	NEV		AD	1206-5/6	7	2	15	4					12/06/13
WASHOUGAL	I-205	CHUM	12/06/13	NEV		AD	1212-1/2	18	4	35	8					12/13/13
WASHOUGAL	DUNCAN CR	CHUM	12/11/13	NEV		AD	1212-3/4	2	1	4	2					12/13/13

Attachment 2: Fish Health Summaries - Washougal Hatchery, April 1, 2007 through September 30, 2007 to April 1, 2013 through Septmber 30, 2013.

Juveniles: Coho

2006 brood coho

Some BCWD found in April 2007, due to heavier densities; mortality was reduced after they were split, the mortality went down. In December 2007, when density was starting to reach a heavy loading, 100 fish were examined for gill color and presence of Erythrocytic Inclusion Body Syndrome (EIBS). No anemia or EIBS was found. The dead fish examined had BCWD. Some fish were transferred to Skamania Hatchery to lighten the pond density; fish transferred well with few mortalities. More fish were transferred in February 2008, as loadings got heavy again; fish handled well in the transfer. Mortality in the lagoon (Pond 27) remained low until late-February, when mortalities reached up to 300/d (0.01%/d) at the screen. Another look at the gills produced 2/40 anemic fish but still no EIBS could be found. Some flashing was observed at the beginning of March, and there was a light amount of *Trichodina* on the skin; this was not treated. Some dead fish were observed at the bottom of the lagoon at the end of March, just prior to hauling the fish to the Klickitat River. The mortality remained consistently around 200-300/day at the screen. BCWD was present in the dead fish examined. A small population gathering toward the screen end had fungus on their heads. After fish were transferred to Klickitat in March, the losses were gathered off the bottom of the lagoon and estimated to be 65,000 fish or a total of 2.5 %.

Previous Mitchell Act reports have discussed the overall survival of these fish reared in the lagoon, and questioned the success of this program. The decision lies with the Klickitat tribe and the committee for *U.S. v OR* and the resultant settlement agreement about whether this program be reduced or other stations found to rear the excess coho that the lagoon can't handle.

2007 brood coho

In May 2008, one egg-take that had received a dose of heavily concentrated formalin by accident appeared to have developed teratogenic deformities (a pinched in caudal fin). Fry still grew, but many eventually dropped out, though it was not a significant number. In June 2008, the raceways had experienced heavy loadings prior to splitting and BCWD caused elevated mortality. After splitting they were treated with Aquaflor®. Flashing was observed in late-July 2008, and an inordinate amount of *Epistylus* along with an unknown ciliate were present on skin scrapings in one raceway. Bacterial Gill Disease was diagnosed in six other raceways. Salt blocks were put in these raceways and mortality went down very quickly. There were no fish health issues for the rest of the reporting period.

In January 2009, an exam of fish in Pond 27 showed the presence of BCWD and light *Trichodina*, but there were no significant losses. The amount of water contributing from Boyles Creek was adequate during the time of rearing up until release. Fish were healthy at the time of transfer to the Klickitat from the lagoon (Pond 27). This is attributed lower loading densities (800,000 fish were transferred and reared at Skamania Hatchery). Two raceways needed treatments for BCWD in February 2009 with Aquaflor® for 10 days.

2008 brood Type-N coho

In May 2009, fry were loaded a little heavily and BCWD was found in some morts, but the level did not warrant treatment. In June 2009, the fish were healthy and a portion was transferred to Klickitat Hatchery. During the late-July 2009, water temperatures in the lower series reached 82°F, and fish experienced serious losses (0.3% daily) from gill *Columnaris*, with lesser amounts of gill amoeba, BCWD, gill bacteria and sunburn. *Ichthyophthirius* was found one week later. Fish responded well to oxytetracycline medicated feed, potassium permanganate and formalin treatments.

2009 brood Type-N coho

In June 2010, some loss occurred during a period of turbidity; this subsided very quickly. No cause of death was found. Raceways were salted. Bacterial Cold Water Disease (BCWD) was found mid-June, and was treated successfully with Aquaflor®. *Columnaris* flared up in August 2010, during a heat spell, and was treated with TM medicated feed promptly, avoiding any significant loss. *Trichodina* was found moderately abundant on the skin of coho slated for transfer to the Deep River Net Pens. They were treated with formalin prior to transport.

In January 2011, fish in two of the raceways were diagnosed with BGD; mortalities decreased after a potassium permanganate treatment. Pond 27 (the "lagoon") was used for the first time since modification and fish in this pond have overall been very healthy. A few smaller fish that lagged at the screen and pond edges had BCWD and some fungus, but the number affected was insignificant and did not require treatment. Fish were healthy at release in May.

2010 brood Type-N coho

Fish remained healthy until August 2011, when they experienced a loss due to *Furunculosis*. Only one raceway of this stock required treatment with Romet®, and the fish responded well. Light *Trichodina* was also present at this time but did not require treatment. Fish were diagnosed with *Trichodina* in December 2011, and treated with formalin; losses remained low and the population remained healthy. Light levels of *Trichodina* were again found on these fish prior to transfer to the Yakama Indian Nation Klickitat Hatchery. The fish were feeding well and there was no associated loss so no treatment was necessary. The crew has noticed evidence of bird damage on some of the mortality and otherwise the fish look very good; these fish were healthy upon release into the Klickitat River on April 6, 2012. Rebuild of Pond 27 (lagoon) has been successful: this stock of fish remained healthy at release on May 1, 2012.

2011 brood Type-N coho

Fish remained healthy until mid-May 2012, when a number of the raceways experienced a loss due to dropout and BCWD. The fish initially responded well to a Florfenicol® medicated feed treatment. However BCWD reoccurred in mid-June and this time the fish were treated with oxytetracycline medicated feed. They were healthy until mid-August 2012, when *Columnaris* caused loss; a number of raceways were treated with oxytetracycline medicated feed. During the winter low levels of *Trichodina* were observed, which did not warrant a formalin treatment. In January 2013, there was some problem with eye picking in the fish in Pond 27 (lagoon) as the fish remained crowded into the lower quarter of the pond. This was probably due to birds entering at the upper end of the pond. Crew worked to discourage predators and the fish eventually disbursed throughout the pond. Fish from Pond 27 were transferred to Klickitat Hatchery in March 2013. On-station fish remained healthy in April, but were found to have moderate levels of *Trichodina* just prior to release. Fish condition was good, so no treatment was; loss was low, the close proximity to release and entry into saltwater will rid the fish of *Trichodina*. Fish were released on May 1, 2013.

2012 brood Type-N coho

Fish were healthy into May 2013, with only some elevated dropout. Loss dramatically increased by mid-May due to BCWD; some of the fish were treated with a 10 days of Florfenicol® medicated feed. Other raceways were impacted in June, requiring an additional treatment. Fish were healthy until late-July when *Columnaris* began causing loss, requiring 10 day treatments with oxytetracycline medicated feed. *Columnaris* continued to involve other raceways of fish into early-September 2013, and additional oxytetracycline medicated feed treatments were given in addition to external potassium permanganate treatments.

14 SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

15 ADDENDUM A. PROGRAM EFFECTS ON OTHER (AQUATIC OR TERRESTRIAL) ESA-LISTED POPULATIONS. (Anadromous salmonid effects are addressed in Section 2).

15.1 List all ESA permits or authorizations for USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species associated with the hatchery program.

The WDFW and the USFWS have a Cooperative Agreement pursuant to section 6(c) of the Endangered Species Act that covers the majority of the WDFW actions, including hatchery operations.

> *"The department is authorized by the USFWS for certain activities that may result in the take of bull trout, including salmon/steelhead hatchery broodstocking, hatchery monitoring and evaluation activities and conservation activities such as adult traps, juvenile monitoring, spawning ground surveys..."*

15.2 Describe USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species and habitat that may be affected by hatchery program.

Several USFWS listed and candidate species are found in Cowlitz County, however the hatchery operations and facilities for this program do not fall within the critical habitat for any of these species. As such there are no effects anticipated for these species.

Listed or candidate species:
"No effect" for the following species:

Bull trout (*Salvelinus confluentus*) – Threatened (Critical Habitat Designated)
Nelson's checker-mallow (*Sidalcea nelsoniana*) –Threatened
Marbled murrelet (*Brachyramphus marmoratus*) –Threatened (Critical Habitat Designated)
Columbian White-Tailed deer (*Odocoileus virginianus leucurus*) – Endangered
Gray Wolf (*Canis lupus*) –Threatened
Northern Spotted owl (*Strix occidentalis caurina*) –Threatened (Critical Habitat Designated)

Candidate Species
North American wolverine *(Gulo gulo luteus)* – contiguous U.S. DPS

15.3 Analyze effects.

Not applicable.

15.4 Actions taken to minimize potential effects.

Program coho are released fully smolted to foster rapid outmigration from the basin and to minimize predation and residualism risks.

15.5 References

Not applicable.

16 "Take" Tables

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Fall Chinook (*Oncorhynchus tshawytscha*)	**ESU/Population:** Lower Columbia River Chinook	**Activity:** Washougal Type-N Coho Program
Location of hatchery activity: Washougal Hatchery, Washougal River (WRIA 28.0159) at RKm 22.0	**Dates of activity:** November-January	**Hatchery program operator:** WDFW

Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass [a]				
Collect for transport [b]				
Capture, handle, and release [c]			TBD	
Capture, handle, tag/mark/tissue sample, and released [d]				
Removal (e.g. broodstock) [e]				
Intentional lethal take [f]				
Unintentional lethal take [g]		TBD	TBD	
Other Take (specify) [h]				

Take Tables to be submitted to NOAA-NMFS, in progress.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Instructions:

1. An entry for a fish to be taken should be in the take category that describes the greatest impact.
2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).
3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.

Table 2. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Steelhead *(Oncorhynchus mykiss*)		**ESU/Population:** Lower Columbia River Steelhead		**Activity:** Washougal Type-N Coho Program
Location of hatchery activity: Washougal Hatchery, Washougal River (WRIA 28.0159) at RKm 22.0		**Dates of activity:** November-January		**Hatchery program operator:** WDFW
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass [a]			TBD	
Collect for transport [b]				
Capture, handle, and release [c]			TBD	
Capture, handle, tag/mark/tissue sample, and released[d]				
Removal (e.g. broodstock) [e]				
Intentional lethal take [f]			TBD	
Unintentional lethal take [g]		TBD	TBD	
Other Take (specify) [h]				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Table 3. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Coho (*Oncorhynchus kisutch*)	**ESU/Population:** Lower Columbia River Coho	**Activity:** Washougal Type-N Coho Program
Location of hatchery activity: Washougal Hatchery, Washougal River (WRIA 28.0159) at RKm 22.0	**Dates of activity:** November-January	**Hatchery program operator:** WDFW

Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass [a]			TBD	
Collect for transport [b]				
Capture, handle, and release [c]				
Capture, handle, tag/mark/tissue sample, and released [d]				
Removal (e.g. broodstock) [e]			TBD	
Intentional lethal take [f]			TBD	
Unintentional lethal take [g]	TBD	TBD		
Other Take (specify) [h]				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Table 4. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Chum (*Oncorhynchus keta*)		**ESU/Population:** Lower Columbia River Coho		**Activity:** Washougal Type-N Coho Program
Location of hatchery activity: Washougal Hatchery, Washougal River (WRIA 28.0159) at RKm 22.0		**Dates of activity:** November-January		**Hatchery program operator:** WDFW
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	**Juvenile/Smolt**	**Adult**	**Carcass**
Observe or harass [a]			TBD	
Collect for transport [b]				
Capture, handle, and release [c]			TBD	
Capture, handle, tag/mark/tissue sample, and released [d]				
Removal (e.g. broodstock) [e]				
Intentional lethal take [f]			TBD	
Unintentional lethal take [g]		TBD	TBD	
Other Take (specify) [h]				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.